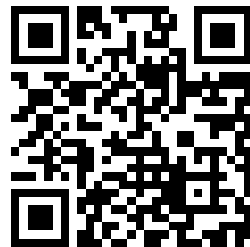

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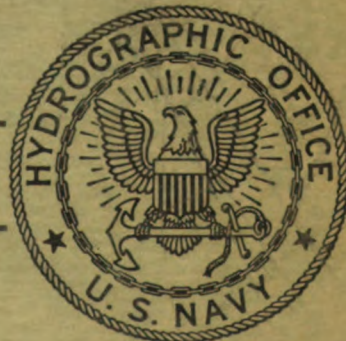
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THE MEDITERRANEAN
Volume III

H. O. Pub. No. 153

54





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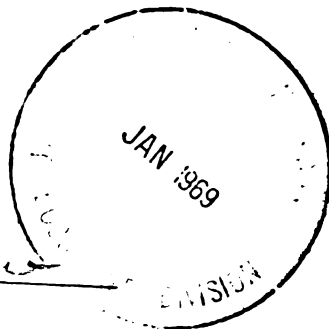
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SAILING DIRECTIONS

for

THE MEDITERRANEAN VOL. III

4th Edition, 1968



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THE MEDITERRANEAN
VOLUME III

**Southeast Italy, the Adriatic, and western
Greece to Akra Tainaron**

Fourth Edition
1968

Published by the U. S. Naval Oceanographic Office
under the authority of the Secretary of the Navy



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Change 1

HOW TO KEEP THIS BOOK CORRECTED

As initially published, this book contains material based upon information available in the U.S. Naval Oceanographic Office through the date given in the preface. Subsequently it should be brought up to date by replacing obsolete pages with loose-leaf change pages, which are published at appropriate intervals in consecutively numbered sets called Changes. A later Change does not automatically cancel an earlier Change, therefore each Change must be inserted in sequence as published; eventually the book will contain change pages from several different Changes. A revised List of Effective Pages included in each Change lists the correct pages comprising the complete book. The publication of new Changes, which normally occurs every twelve to eighteen months, is announced in Notice to

Mariners. Instructions for ordering Changes will be found in the front part of the book.

In the interval between Changes, information that may amend material in this book is published in the weekly Notice to Mariners. The Notice to Mariners number and paragraph number should be marked on applicable pages, as indicated by the page number at the end of each paragraph. This information should also be recorded on the Chart/Publication Correction Record Cards (NHO 5610/2) for the affected pages. The Notice to Mariners should be kept intact and reference made to it as required. Book owners will be placed on the Notice to Mariner mailing list on request to the U.S. Naval Oceanographic Office, Washington, D.C. 20390.

PREFACE

This publication, *Sailing Directions for the Mediterranean*, Volume III, is the fourth edition of Oceanographic Office Publication No. 54. It is not a new edition in the usual sense, but a consolidation of the previous edition corrected by supplementary data available in the Oceanographic Office to 10 Aug. 1968 including Notice to Mariners No. 32 of 1968.

The principal sources examined in the preparation of the edition on which this volume is based are:

Mediterranean Pilot, Vol. III, 8th edition, Admiralty, London, 1957, and Supplement No. 5, 1967.

Portolano del Mediterraneo, Vol. 1c, Genoa, 1957, and Change 2, 1959.

Peljar Jadranskog Mora, Split, 1964.

Greek Sailing Directions, Vol. A, 1938. Reports from U.S. naval and merchant vessels, charts, light lists, tide tables, and documents.

Explanatory remarks—Coastal descriptions.—Beginning with Chapter 2, chapters in this publication are divided into major divisions, or parts, consisting of relatively short sections of coast or of bays or gulfs, islands or island groups, sounds and channels, etc. Major divisions are normally arranged in geographic sequence according to the general plan of the book, and are subdivided, according to subject, into subordinate divisions, which are arranged in the order the various subjects would normally be considered by vessels operating in the area. For example, information normally required for navigating in the offing is given before that required for navigating close inshore, and outer dangers are described before those that fringe the coast. This arrangement makes reference to only the first few paragraphs of each major division covering a particular coast necessary for normal offshore navigation, but progressively more study of the text is required as concern for coastal details increases, as when approaching close-to, entering port, or anchoring. The subordinate divisions are appropriately titled to aid in locating specifically required information, and their arrangement is designed to eliminate comprehensive reading if the various inshore details of a coast are of no concern.

Graphic indexes.—A general index diagram showing the area described in this publication and the general limits of the various chapters is located in the front part of the book. An individual chapter index diagram showing an enlargement of the specific area described is located at the beginning of each chapter. These chapter indexes also show the limits of the best-scale charts issued to the U.S. Naval vessels by the Oceanographic Office and indicate the place in the text where a description of various designated localities begins. To find the description of a particular locality, simply refer to the general index to determine the appropriate chapter, and then refer to the particular chapter index, which will indicate by means of section numbers the place in the text where a description of the area that includes the particular locality begins.

Bearings are true, and are expressed in degrees from 000° (north) to 360°, measured clockwise. Bearings limiting light sectors are toward the light.

Courses are true, and are expressed in the same manner as bearings. The directives "steer" or "make good" a course mean, without exception, to proceed from a point of origin along a track having the identical meridional angle as the designated course. Vessels following the directives must allow for every influence tending to cause deviation from such track, and navigate so that the designated course is continuously being made good.

Courses given throughout the text under the heading "Navigation" are as plotted on the best-scale chart of the locality, and they simply indicate a track that may be followed along the coast being described to avoid grounding. From suitable points on these coastal tracks, courses to ports or other places in the area are given wherever appropriate.

Distances are expressed in nautical miles of 1 minute of latitude, or approximately 2,000 yards. Distances of less than 1 mile are expressed in yards or fractions of a mile. Decimals are occasionally used.

Wind directions are the true directions from which winds blow.

Current directions are the true directions toward which currents set.

Charts shown on the graphic indexes at the beginning of each chapter are the largest scale charts of the locality on issue to U.S. Naval vessels by the Oceanographic Office. The Catalog of Nautical charts and Publications shows complete Oceanographic Office chart coverage.

Geographic positions given at intervals throughout the text are approximate only and are intended to facilitate reference to the charts.

Depths are referred to chart datum and are expressed in fathoms, feet, or meters.

Heights are referred to the plane of reference used for that purpose on the charts and are expressed in feet.

Light and fog signal characteristics are not described, and light sectors are not usually defined. The Light Lists should be consulted for complete information.

Radio navigational aids and radio weather services are not described in detail. Publications Nos. 117A and 118A, should be consulted.

Geographic names are generally those used by the nation having sovereignty. Names in parentheses following another name are alternate or obsolete names that may appear on some charts. In general, alternate, or obsolete names are quoted only in the principal description of the place.

Corrective Information.—It is requested that the U.S. Naval Oceanographic Office, Washington, D.C. 20390, or any of its branch offices, be advised of any inaccuracy found in this publication or of additional navigational information considered appropriate for insertion. Various Oceanographic Office forms are available for this purpose.

Short corrections, formerly used to maintain this publication, are now being incorporated in the change pages to eliminate hand corrections by the user. If short corrections are found to be necessary in the future, a page of instructions for their use will be furnished at the time of publication.

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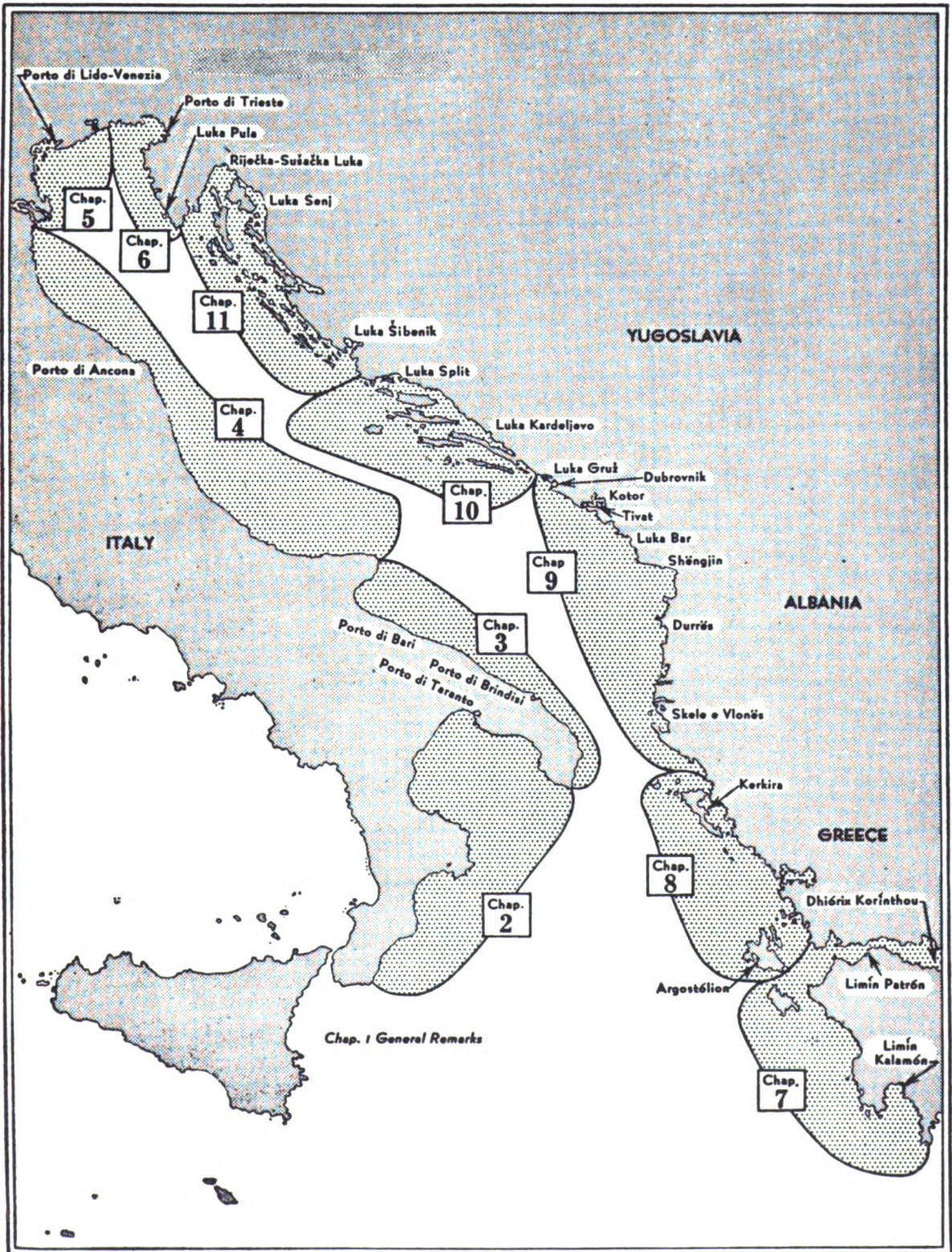
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**RECORD OF CHANGES TO H.O. PUB. 54
FOURTH EDITION, 1968**

[illegible]

HOW TO OBTAIN CHANGES

Sales to General Public.—When this book is sold, all Changes in effect at the time are furnished at no extra cost. Subsequent Changes have a standard selling price of \$1.75 each. Whenever possible, Changes should be bought from one of the local sales agents listed in Part I of the Catalog of Nautical Charts and Publications. If there is no sales agent available, Changes may be ordered by mail from the U.S. Naval Oceanographic Office Washington, D.C., 20390 or from either of the Distribution Centers listed below. Such orders must be accompanied by check or money order made payable to the U.S. Naval Oceanographic Office. Postage stamps or Government Printing Office coupons cannot be accepted as payment. Changes will be mailed, postage paid, by regular mail. Special handling costs, such as air mail, special delivery, etc. must be borne by the purchaser.

In emergencies, Changes may be bought from one of the Branch Oceanographic Offices also listed in the catalog. Branch Offices do not handle mail orders.

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EXPLANATION

- 19 Original book page. Only odd-numbered pages are listed; their reverse sides are taken for granted unless otherwise noted.
- 19-3 Change page from Change No. 3. It replaces previously effective page 19.
- 20a-3 Additional book page included in Change No. 3. Pages 20b, 20c, etc., if included, are inserted in alphabetical order.

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This list supersedes any previous list. The effective pages of each listed Change must be applied to bring this publication up to date. Previous Changes not listed are no longer effective.

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THE SHORT CORRECTION SYSTEM

Although Change pages replacing obsolete pages represent the ideal correction system for loose-leaf books, the Short Correction system is used as a reasonable alternative when corrections are too small to justify replacing an entire page.

Short Corrections are intended to be kept intact in the front of the book for ready reference as needed. The previous option of cutting apart and pasting Short Corrections to affected pages has been discontinued in the interest of simplicity. Previous Short Corrections that remain effective are repeated in subsequent Changes, and both old and new corrections for any given page are grouped together for easy reference. Pages affected by Short Corrections that are new with this Change are listed below. It is recommended that the top of each affected book page be marked "See Short Corrections" as a reminder that a Short Correction applies.

Short Corrections are preceded by a code group which shows the applicable page number, column, line number, and first word of line affected. Unless otherwise indicated each Short Correction replaces the entire line or lines designated. Exceptions are self-explanatory.

Example: 429-L-10 (Island). The Short Correction applies to Page 429, left column, line 10. "Island", the first word of line 10, serves as a check on the line count.

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CHAPTER 1

GENERAL REMARKS—BUOYAGE—SIGNALS—PILOTAGE—REGULATIONS—CAUTIONS— WINDS AND WEATHER—OCEANOGRAPHY—ROUTES

Plan.— This volume describes the south-eastern and eastern coasts of Italy, the western coast of Greece, and the coasts of Albania and Yugoslavia, all of which embrace the Adriatic Sea and its approaches between Capo Spartivento and Akra Taínaron. The arrangement is in the order mentioned above with a progressive northward movement.

GENERAL REMARKS

ADRIATIC SEA

1-1 The Adriatic Sea is an arm of the Mediterranean Sea that separates Italy from the Balkan countries of Albania and Yugoslavia. It is entered through the Strait of Otranto between Capo Santa Maria di Leuca, Italy, and Akra Kefáli, Nisos Kérkira, and extends about 480 miles northwestward to the head of the Gulf of Venice. From abreast Brindisi, Italy, and Pellg i Drinit, Albania, the two coasts of the sea are nearly parallel with an average width of 90 miles and a maximum width of 110 miles. The narrowest part of the sea is at its entrance, where it is about 40 miles wide.

The Italian shore, except where the Apennines fall steeply to a narrow coastal range between Promontorio del Gargano and Porto di Corsini, is low, merging to the northwestward into marshes and lagoons about the delta of Fiume Po, the basin of which is a continuation of the Adriatic Sea. From Ancona northward the coast is intersected by numerous streams and rivers that carry great deposits into the sea and form extensive shallows which border the intervening shore.

The east coast of the Adriatic Sea is generally rugged and, southward of the Istrian Peninsula, is fringed with numerous off-

lying islands. Opposite the islands off the Dalmatian coast as far southward as Šibenik the sea is relatively shallow and in the extreme north seldom exceeds 46m (25 fm). Southward of the above-mentioned islands the depths increase to over 500 fathoms.

The color of the Adriatic Sea has a greenish hue when undisturbed, being darker than the general color of the Mediterranean Sea.

ITALY

1-2 The Republic of Italy includes not only the whole of the Apennine Peninsula but also the large Mediterranean islands of Sicily and Sardinia. In all, the country had an estimated population of 53,639,000 in 1966 and comprised an area of 116,298 square miles. Roma is the capital and largest city.

Physical features.—The southern extremity of Italy is comparatively high, but the height of the coastal range decreases gradually to the northward where it forms Golfo di Taranto. Between Capo Santa Maria di Leuca and Promontorio del Gargano, the coast is low, uniform, and slopes gently to the sea, but from the promontory to Porto di Corsini it is formed by a chain of hills that branches out from the main range of the Apennines, lying about 40 miles inland. Beyond Porto di Corsini the coast again gradually decreases in height to the broad plain of Fiume Po; this marshy plain extends along the entire western and northern shores of the Gulf of Venice to Trieste.

The Italian coast is generally fringed by sandy beaches with rather shallow approaches and has few roadsteads. Its harbors, most of which are inaccessible to large vessels, are kept open by artificial means for the busy coasting trade. Between Ancona

and Punta Sdobba the coast is encumbered with numerous shoals of sand and mud brought down by the rivers in this region. It may, however, be approached sufficiently near to identify its more conspicuous objects, which may usually be made out from a distance of 10 to 12 miles. Between Venezia and Fiume Timavo, the low and sandy coast is backed by lagoons and marshy plains, which are intersected by numerous canals and rivers that form a network of inland waterways.

Ports.—The principal Italian ports described in this volume are Taranto, Brindisi, Bari, Ancona, Venezia, Monfalcone, and Trieste.

Products and industries.—The principal crops are wheat, oats, corn, sugar beets, grapes, and olives. The principal mineral products are iron, zinc, manganese, lead, sulphur, and asphalt. Only sulphur and mercury outputs yield a substantial surplus for export. The principal industries are agriculture and textile production. Silk culture is carried on extensively and the manufacture of cheese and sugar is important. The chief exports are silk and artificial silk, cotton, vegetables and fruit, wool, hemp, cereals and derivative products, minerals and stone, vegetable fibres, and skins. The chief imports are cereals, sugar, seed, fruit, cotton and cotton goods, woollens, metals, machinery, minerals, wood, and clothing.

Money, weights, and measures.—The monetary unit is the lira, and metal coins of 5, 10, 20, 50, 100, and 500 lire are in circulation. There are also bank notes of 500, 1,000, 5,000, and 10,000 lire; they are neither convertible into gold as foreign monies nor exportable abroad, nor importable from abroad into Italy (except for certain specified small amounts). In addition to bank notes, provisional titles of 5,000 and 10,000 lire are in circulation.

The metric system of weights and measures is in general use.

Communication.—There are over 13,000 miles of railroads in Italy, about two-thirds of which is owned by the state. A branch of the system runs along the coast from Otranto to where it turns inland by way of Porto di Corsini. Another branch traverses the plain of Fiume Po from Venezia around the head of the Gulf of Venice to Trieste. There is an excellent system of highways, especially in the northern part of Italy.

The general telephone and telegraph system is connected with the principal towns. Coastal radio stations available for public correspondence are at Ancona, Bari, Trieste, and Venezia. There is regular steamer communication with all parts of the world. Venezia is connected with Roma by regular air service.

Standard time.—The standard time is that of the meridian of 15° E., or 1 hour fast of Greenwich Mean Time.

1-3 This section has been deleted.

YUGOSLAVIA

1-4 Yugoslavia is a Federal People's Republic composed of six units: Serbia, Croatia, Slovenia, Bosnia and Hercegovina, Montenegro, and Macedonia. It comprises an area of about 99,000 square miles and had an estimated population of about 19,508,000 in 1965. The adriatic boundaries are Italy on the north, and Albania at the river Bojana, on the south. Three closely allied languages are recognized in Yugoslavia: Slovene, Macedonian, and Serbo-Croat.

Physical features.—The Yugoslav coast is closely backed by branches of the Julian and Dinaric Alps which, with their ramifications, form numerous peninsulas and chains of is-

lands. This coast, which is high, rocky, picturesque, and steep, has many natural harbors and inlets, but, since the immediate hinterland is lacking in resources, is generally sparsely inhabited. From Rt Kamenjak to Dubrovnik the coast is fronted by innumerable islands, rocks, and shoals which render navigation difficult and, during the bora, often unsafe. In spite of this fact, however, it is preferred to the Italian coast in winter because of the great number of sheltered inlets which it affords. Between Trieste and Rijeka, the mountainous peninsula of Istria projects about 50 miles southward. Its coasts are high and indented, and the depths off it vary greatly.

Ports.—The principal ports are Rijeka, Šibenik, Split, Gruž, Kotor, Pula, and Karđeljevo.

Products and industries.—The majority of the country's industries are centered in the northwestern part. Agricultural pursuits are carried on in the southern and southeastern part of the country, and the mineral wealth is in the central portion. The principal products are wheat, oats, barley, and various kinds of fruits. There are extensive forests consisting chiefly of beech, oak, and fir. The mineral resources include coal, lignite, iron, lead, copper, chrome, antimony, and excellent materials for the production of Portland cement. The chief exports are lumber, wheat, and livestock. The chief imports are cotton and cotton goods, woolens, iron and machinery, and mineral oils.

Money, weights, and measures.—The monetary unit is the dinar, divided into 100 paras. Coins of 50 paras and 1, 2, 5, 10, 20, and 50 dinars are on issue, as well as notes of 10, 20, 100, 500, 1,000, and 5,000 dinars.

The metric system of weights and measures is in use. The wagon of 10 metric tons

is used frequently as a unit of measure for coal, roots, and corn.

Communication.—In 1957 there were 7,304 miles of railroads. The towns and most of the coastal villages have telegraph offices and are connected to the general telephone system. Coastal radio stations available for public correspondence are at Bar, Dubrovnik, Rijeka, and Split. There is steamer communication with foreign ports and between the coastal towns and off-lying islands.

Standard time.—The standard time is that of the meridian 15°E., or 1 hour fast of Greenwich Mean Time.

Holidays.—Official Yugoslavian holidays are: January 1, January 2 (New Years Day); May 1, May 2 (Labor Days); July 4 (Day of Fighter); July 13 (Day of National Insurrection at Zelemika and Bar only); July 27 (Day of National Insurrection at Pula, Rijeka, Zadar, Sibenik, Split, Ploce and Dubrovnik only); and November 29 and November 30 (Days of the Republic).

ALBANIA

1-5 The Republic of Albania has its boundaries on the Adriatic Sea at the river Bojana, on the north, and the mainland northeastward of the port of Kérkira, on the south. It comprises an area of 11,101 square miles and had an estimated population of 1,814,000 in 1964. The two principal language groups are the Ghegs, northward of the river Shkumbi, and the Tosks, in the south. Tiranë is the capital.

Physical features.—In general, the Albanian coast is sparsely settled and is backed in the interior by a chain of lofty mountains, which can be seen from a long distance seaward. Between the river Bojana and Kep i Gjuhëzës the coast is low and sandy, except

in a few places where the mountains project toward the sea, and has relatively shallow depths for some distance offshore. The remainder of the coast is high and steep-to.

Ports.—The principal ports are Durrës, Shëngjin, and Vlonë. In 1960 the ports of Shëngjin, Durres, and Sarandë were declared open to foreign vessels and the ports of Vlonë, Gji i Vlonës, and Sazan Island were declared closed to foreign vessels.

Approach to the open ports is permitted only through authorized routes.

Products and industries.—Albania is a primitive country in relation to European standards. Almost the whole population is engaged in agriculture and livestock raising. Each family produces the greater part of its own necessities. Agricultural methods are backward and great tracts of the country are uncultivated. The country possesses vast forests of oak, walnut, chestnut, elm, beech, pine, and fir trees. The mineral resources, thought to be considerable, are undeveloped. The principal industries are those connected with agriculture, such as flour milling, olive pressing, and cheese making. The oil production is sufficient for home consumption. The chief exports are crude petroleum, food stuffs, skins and hides. The chief imports are cotton and cotton goods, wheat and maize, and metal and machinery.

Money.—The monetary unit is the lek, which is equal to 100 quintars, with 100 leks being equal to 8 roubles.

Communication.—The communication system of Albania is poor by modern standards. All the principal towns are connected by passable roads, of which there are about 1,367 miles. The country has only about 72 miles of railroad trackage.

Standard time.—The standard time is that of the meridian 15° E., or 1 hour fast of Greenwich Mean Time.

GREECE

1-6 The Kingdom of Greece, including its many islands, comprises an area of 50,942 square miles and had an estimated population of 8,388,553 in 1961. The frontier between Greece and Albania reaches the coast at a position northeastward of the port of Kérkira. Athinai is the capitol.

Physical features.—The coast of Greece between Ákra Táinaron and the Albanian frontier is high and steep-to, except near the entrance to Patraikos Kólpos and Amvrakikós Kólpos, where the land is low and marshy. In general the coast is sparsely inhabited and is backed in the interior by high mountains which are visible from seaward. This entire coast is fronted by the Ionian Islands.

Ports.—The principal Greek ports described in this volume are Kérkira, Itháki, Argostolion, Pátrai, Préveza, and Zákinthos.

Products and industries.—Greece is mainly an agricultural country. Although only about one-fifth of the total country area is arable, about three-quarters of its population is engaged in agricultural pursuit. The principal crops are wheat, corn, currants, barley, grapes, oats, and tobacco. The leading industrial products are olive oil, wine, textiles, chemicals, and food stuffs. Among the numerous mineral deposits are iron, iron-pyrites, emery, copper, zinc, lead, silver, manganese, bauxite, antimony, nickel, magnesite ore, marble, and various earths. The principal exports are tobacco, currants, olive oil, and sponges. The principal imports are coal and fuel oils, food stuffs, machinery, timber, and metals.

Money, weights, and measures.—The drachma of 100 lepta is the monetary unit. Notes of 5, 10, 20, 50, 100, 500, and 1,000 drachmai are on issue, as well as metal coins of 5, 10, 20, and 50 lepta and 1, 2, and 5 drachmai.

Although the metric system of weights and measures has been adopted and is in general use, the old system is used occasionally. The principal units of this system are: 1 oke = 400 drams = 2.832 pounds; 1 kantar = 44 okes = 124.08 pounds; 1 pic = 27 inches; 1 stremma = .2471 acre.

The Great Venetian pound (G. V. lb.) is used universally in the currant trade; 2,128 G. V. lbs. = 1 long ton; 1 G. V. lb. = 0.480 kilogram.

Communication.—Greece had 1,609 miles of railroads and 29,294 miles of roads in 1957. There is steamer communication with local and foreign ports. Coastal radio stations available for public correspondence are located at Kerkira and Patrai.

Standard time.—The standard time is that of the meridian 30° E., or 2 hours fast of Greenwich Civil Time.

BUOYAGE

ITALY

1-7 Italy has retained the system of buoyage proposed at the International Buoyage Conference in 1912, but is slowly adopting the method of the International Buoyage System proposed in 1936. Both methods comprise a lateral and a cardinal system.

In either method the lateral system is used mainly in well-defined fairways, and the cardinal system is used along a coast with fringing dangers, closely off-lying islets, and isolated dangers. Both systems may be used either separately or in conjunction along the coastal area mentioned above.

The old system.—The lateral system is as follows: The starboard side of the channel is marked by black buoys with either one or two black conical top marks, points up. Lights, if shown, are usually green. The buoys are either lettered or numbered with even numbers.

The port side of the channel is marked by red buoys with one or two red cylindrical top marks. Lights, if shown, are red. The buoys are either lettered or numbered with odd numbers.

Red and black horizontally banded buoys with a red spherical top mark indicate obstructions. They may be passed on either side.

Black and white horizontally banded buoys with two black conical top marks, base to base, are bifurcation buoys, which are used at the seaward extremity of middle grounds.

Red and white horizontally banded buoys with two red conical top marks, point to point, are conjunction buoys, which are used at the inshore extremity of middle grounds.

Green buoys, some with a letter or an initial of the name of the wreck painted in white, mark wrecks. They are surmounted by green top marks of the same shape used with channel buoys to indicate the side of the fairway. A green spherical top mark indicates that it may be passed on either side. Lights, if shown, are white.

Wrecks are also marked by green floats with two green masts and inscriptions similar to those on wreck buoys. A green spherical top mark indicates the dangerous side of the wreck and two green spherical top marks, displayed vertically, indicates the safe side of the wreck.

Green buoys with the letter T painted in white are moored on the outer ends of submarine cable areas. They are surmounted

by green top marks of the same shape used with channel buoys to indicate the side of the fairway. Lights, if shown, are green.

In the cardinal system the buoys indicate the nearest of the four cardinal bearings from the danger. One or two top marks are used; they are either spherical or hemispherical, curved surface up.

A red buoy with a red spherical top mark marks the southern side of the danger; a black buoy with a black top mark or a white buoy with a white top mark marks the northern side of the danger; a red and white horizontally banded buoy with a red top mark marks the eastern side of the danger; and a black and white horizontally banded buoy with a black top mark marks the western side of the danger.

1-8 The new system.—The lateral and cardinal systems may be used alternatively or simultaneously according to local disposition, and when so used, the transition from one system to the other is noted in hydrographic publications or by using conical buoys. These buoys are painted either in red and white or black and white oblique stripes and are surmounted by top marks that are different from the ones used on the channel buoys but in any case red and black, respectively in color.

In the lateral system: Starboard hand buoys are conical in shape, painted black or in black and white checkers, and may or may not carry top marks. If top marks are carried, the black buoy is surmounted by a black cone, point up, and the black and white checkered buoy is surmounted by two black cones, base to base; the latter is never used at the channel entrance. Lights, if shown, are usually green.

Port hand buoys are cylindrical in shape, painted red or in red and white checkers, and may or may not carry top marks. If top marks are carried, the red buoy is sur-

mounted by a red cylinder, and the red and white checkered buoy is surmounted by a red T; the latter is never used at the channel entrance. Lights, if shown, are usually red.

If the above-mentioned buoys are numbered or lettered, this numbering or lettering begins from seaward; odd numbers will be on the starboard hand and even numbers on the port hand.

Channel entrance buoys show white lights.

Bifurcational buoys are spherical in shape, painted either in red and white or black and white horizontal bands, and are surmounted by top marks to indicate the direction of the channel. When the principal channel is to the right, a red cylinder surmounts a red and white horizontally banded buoy. When the principal channel is to the left, a black cone, point up, surmounts a black and white horizontally banded buoy. When the channels are of equal importance, a red sphere surmounts a red and white horizontally banded buoy.

Conjunctive buoys are of the same shape and color as bifurcational buoys; they also carry top marks to indicate the direction of the principal channel. A red T top mark on a red and white horizontally banded buoy indicates that the principal channel is to the right. Two black cones, base to base, on a black and white horizontally banded buoy indicates that the principal channel is to the left. A red cross top mark on a red and white horizontally banded buoy indicates the channels are of equal importance.

Lights, if shown, on bifurcational and conjunctive buoys are of the same color as the channel buoys, but have a different characteristic.

Midchannel buoys are usually of a different shape from the above-mentioned buoys, have a latticed superstructure, and are painted either in black and white or red and white vertical stripes. The top marks are

distinctly different from the conical, spherical, and cylindrical ones surmounting other buoys. Lights, if shown, are different from the lateral system but occulting in character.

Midchannel buoys may be passed on either side, but it is preferable to leave them on the port hand.

1-9 Wrecks are marked with green buoys with the letter R or the word *Relitto* in white. Otherwise they conform either to the lateral or cardinal system. When used according to the cardinal system, they are placed in the east and west quadrants only. Lights, if shown, are green; two flashes indicate leave to the left, 3 flashes indicate leave to the right, and an occulting light indicates that it may be passed on either side.

In the cardinal system of marking wrecks, a group flashing green light is shown on the east quadrant buoy, and a flashing green light is shown on the west quadrant buoy.

Wrecks are also marked by floats that are painted green and carry the same inscriptions used on wreck buoys. When the wreck is to the right a green cone, point up, is displayed over two green spheres; in fog three gongs on a bell are sounded every 30 seconds.

When a wreck is to the left a green cylinder is displayed over a green sphere; in fog two gongs on a bell are sounded every 30 seconds.

When a wreck may be passed on either side two green spheres are displayed from both sides of the yardarm; in fog four gongs on a bell are sounded every 30 seconds.

All shapes are displayed vertically.

Lights, if shown, are fixed green, one for each shape, and displayed in the same order.

Isolated dangers are marked by spherical buoys, the upper part painted red, the lower part black, and separated by a white horizontal band. Top marks, if carried, are spherical in shape and either black, red, or black and red in color. Lights, if shown, are either red or white.

Quarantine buoys are conical in shape and yellow in color.

Sewer outfalls, spoil grounds, and high tension cables are marked with conical buoys, the upper part yellow and the lower part black. Lights, if shown, are different from navigational lights.

Military, naval, and air operational areas are usually marked with conical buoys, painted white with four vertical blue stripes and marked ZP.

The cardinal system.—The NW-NE quadrant is marked by a black conical buoy with a white horizontal band; it is surmounted by a black cone, point up. Lights, if shown, are flashing white.

The NE-SE (east) quadrant is marked by a conical buoy, the upper part red and lower part white; it is surmounted by two red cones, base to base. Lights, if shown, are flashing red.

The SE-SW quadrant is marked by a cylindrical buoy painted red with a white horizontal band; it is surmounted by a red cone, point down. Lights, if shown, are group flashing red.

The SW-NW (west) quadrant is marked by a cylindrical buoy, the upper part black and lower part white; it is surmounted by two cones, points together. Lights, if carried, are group flashing white.

Tunny net marker.—Tunny nets on the Italian coast are usually laid out in I-shaped form; the end of one leg of the net is secured ashore and the other parts are secured in position by anchored floats or buoys, the open end of the nets facing the direction of the usual tunny run. The middle of the seaward side of tunny nets is marked by a float displaying a red ball over a white ball, in daytime, and a red light over a white light, at night.

Except in anchorages and in frequented channels, tunny nets which do not extend beyond 330 yards offshore are not marked by lights.

YUGOSLAVIA

1-10 The buoyage system employed by Yugoslavia is identical to the Italian system, described above.

GREECE

The Greek system of buoyage is as follows: In all cases the entrance of a channel is considered to be at its seaward end; where doubt may exist as to which is the seaward end of a channel, in those channels whose direction is more or less north and south the northern end is considered to be the entrance. In channels which run in a general east and west direction, the eastern end is considered to be the entrance.

Two systems of buoyage, old and new, are in use and will remain so for a considerable time.

New system.—Marks to be left on the starboard hand when proceeding inward are painted black and if lighted show a green light. They consist of can buoys with a cylindrical topmark or surmounted by a tripod with a lantern at its apex.

Marks to be left on the port hand when proceeding inward are painted red and if lighted show a red light. They consist of can buoys with a cone point up as a topmark or surmounted by a tripod with a lantern at its apex.

Spar or pillar buoys, with or without lights and of the appropriate color, are also used on either hand.

Isolated dangers are marked by conical buoys painted in black and red horizontal bands with a red spherical topmark.

The bifurcation of a channel is marked by a conical buoy painted in black and white horizontal bands with a black diamond-shaped topmark.

The junction of two channels is marked by a conical buoy painted in red and white horizontal bands with two red cones points together as a topmark.

A danger in the fairway to be left on the starboard hand when proceeding inward and on the port hand when proceeding outward is marked by a spherical buoy painted in black and white horizontal bands.

A danger in the fairway to be left on the port hand when proceeding inward and on the starboard hand when proceeding outward is marked by a spherical buoy painted in red and white horizontal bands.

A wreck is marked by a green conical buoy.

Old system.—Conical, can, barrel-shaped, and spherical buoys are used indiscriminately; those to be left on the starboard hand when proceeding inward are painted black and, if lighted, are conical and show a green light. Buoys to be left on the port hand are painted red and, if lighted, are conical and show a red light.

SIGNALS

ITALY

1-11 Italian Signal Stations are usually painted in black and white checkers.

Italian Storm Signals.—The following described storm warning signals are displayed by stations on the Italian coast:

<i>Day</i>	<i>Night</i>	<i>Meaning</i>
Cone with point up.	2 red lights vertically disposed.	Northwesterly gale.
Cone with point down.	2 white lights vertically disposed.	Southwesterly gale.
2 cones with points up.	Red light over a white light.	Northeasterly gale.
2 cones with points down.	White light over a red light.	Southeasterly gale.
2 cones with bases together.	A red light.	Direction of gale undetermined.

Signals displayed by mine sweepers.—Italian vessels engaged in mine sweeping, display one ball at the mast head and one ball on the yard arm corresponding to the side on which the drag is rigged; if drags are rigged on both sides, a ball is displayed on each yard arm. At night, the balls are replaced by green lights.

Passing vessels should give sweepers a berth of at least 1 mile.

The leading sweeper of a group of sweepers will display the appropriate letters of the International Code of Signals whenever approached by another vessel within a distance of 1 mile, and will be repeated by all sweepers in the group. This signal may also be made by flashing light. In addition she will display two red balls with a white double cone between, vertically disposed.

TRAFFIC CONTROL SIGNALS.—Italian naval vessels when engaged in traffic control display the following lights at night in addition to navigation lights.

3 RED LIGHTS.—Free entry into the harbor is prohibited.

3 WHITE LIGHTS.—No restrictions for free entry into the harbor.

The **LIGHTS** are displayed vertically, 6 feet apart.

SIGNALS RELATING TO SUBMARINES.—When submarines are operating in areas established for that purpose, the signal stations in sight and the vessels escorting them will hoist the appropriate signal of the International Code of Signals. Vessels are cautioned to use the greatest care in traversing such areas and to avoid them, if possible, when the nearby signal station has hoisted the signal. Italian submarines unable to surface may release orange indicator buoys marked with their names.

YUGOSLAVIA

1-12 YUGOSLAVIAN STORM SIGNALS

are identical to the Italian system, described above.

GREECE

1-13 SIGNALS RELATING TO SUBMARINES.—Submarines use the following smoke signals when surfacing, indicating that vessels should keep clear and not stop their engines:

1. One red smoke candle, probably repeated.—Indicates I am surfacing in emergency.

2. Two white or yellow smoke candles at 3 minute intervals.—Indicates I intend to surface. My position is as indicated.

Submarines unable to surface may release any of the following:

(a) A spherical orange indicator buoy, marked with their name.

(b) Yellow or white smoke candles.

(c) An oil slick release.

Vessels should immediately report to the Greek Naval authorities the sighting of any of these signals, should buoy the position, and should remain, keeping careful watch for survivors, at a distance of about 200 yards from the position of the submarine.

1-14 SIGNALS TO BE MADE BY VESSELS INCONVENIENCED BY SEARCHLIGHTS.—In the event of the navigation of a vessel being inconvenienced by the glare from searchlights near a port, she should make the International Code signal ZO (— . . — — —) by lamp and by whistle, siren, or foghorn.

Both the light and sound signals should be employed, whenever possible, and should be repeated until the inconvenience is removed.

Only real urgency should necessitate the use of this signal since it is not possible for the operator to know which projector is affected unless the vessel is actually in the rays of the searchlight.

This signal is designed to assist mariners; no liability whatever will be admitted.

1-15 SUBMARINE SIGNALS.—British vessels accompanying submarines, which may be submerged, fly signals of the International code to denote that submarines are in the vicinity. Other vessels are cautioned to navigate so as to give a wide berth to any such vessel, but if from any cause it is necessary to approach her, vessels should proceed at slow speed until warning of the danger zone is given by flags, semaphore, or megaphone, etc., a good lookout being kept meanwhile for submarines, whose presence may be indicated only by their periscopes or snorkels showing above water.

A submarine submerged at too great a depth to show her periscope may sometimes indicate her position by releasing a smoke candle, which gives off a considerable volume of smoke on reaching the surface. Her position may sometimes be indicated by red and white or red and yellow floats that are towed on the surface close astern.

It must not be inferred that submarines exercise only when accompanied by escorting vessels. Under certain circumstances warnings may be broadcast that submarines are exercising in specified areas.

1-16 This section has been deleted.

PILOTAGE

ITALY

1-17 Pilots of the Italian Pilot Service are designated either of first or of second grade, depending upon the volume of shipping handled by a port, and hold rank of at least chief mate. At ports where no government authorized pilot is stationed, the port captain may authorize a local experienced mariner to perform pilot duties. Unless especially authorized, pilots are not permitted to perform such duty on a vessel towing another.

For compulsory pilotage, see information given with port concerned.

Italian pilot boats are painted black with an all-around white stripe, and with the word "PILOTA" in white painted on bows and stern, with, in the case of a sailing boat, the letter "P" on each sail and in a power vessel on each side of her funnel. In daytime, pilot boats display a flag having three equally wide vertical stripes; the outer two stripes are blue and the middle stripe is white with the letter P in blue.

Vessels requiring pilots should either, in daytime: hoist their national flag on a white field, or display either the flag G or the signal of the International Code of Signals, and, at night; send up a white flare every 15 minutes; show a white light at short intervals; or give the signal of the International Code of Signals by blinker light.

A pilot boat will either dip her distinguishing flag or show a flashing light to indicate her intention of coming alongside.

YUGOSLAVIA

1-18 Pilotage is compulsory on some parts of the coast and in many of the harbors of Yugoslavia for foreign merchant vessels over 500 tons gross register.

A vessel requiring a pilot should give as much notice as possible and state when and where the pilot is required to meet the ship. There are pilot stations at Rijeka, Split, Gruž, and Zelenika.

All vessels bound to ports in Yugoslavia from foreign ports are required to report their arrival 24 hours in advance through the Split coastal radio station, call sign YUS and/or YUT, on frequency of 500 kc. Pilots for Gruž and Zelenika should be requested through Dubrovnik coast radio station.

Vessels desiring a pilot in regions where pilotage is not compulsory, can use pilots from the stations in Rijeka, Split, and Gruž. In this case it is necessary to notify the port authorities office in one of the three above-mentioned localities at least 24 hours in advance. The vessel should then proceed to the anchorage in Luka Pula where the pilot will board. If a pilot is taken for the return trip, he will disembark at the same place.

Pilot boats display a blue flag with the

letter P in white, in the center, and have the same letter, in white on each bow; the hull of the boats are painted blue with a white stripe.

Vessels requiring pilots should either, in daytime: hoist their national flag on a white field, or display either the flag G or the signal of the International Code of Signals, and, at night; burn a blue pyrotechnic light, or signal by flashing light, or if in fog, by audible sound.

A pilot boat will either display and dip the International Code flag X, or signal the numeral 3 by flashing light or audible sound.

GREECE

1-19 Pilotage is compulsory for all vessels for most of the harbors in Greece and in the archipelago. See information given with the port concerned.

REGULATIONS

PORT REGULATIONS

1-20 At most of the important ports in Italy, Yugoslavia, Albania, and Greece, vessels are subject to regulations, a copy of which should be obtained on arrival.

YUGOSLAVIA

1-21 All vessels bound to ports in Yugoslavia from foreign ports are required to report their estimated time of arrival twenty four hours in advance of arrival. See Pilotage in Yugoslavia (sec. 1-18).

GREECE

1-22 Coastal navigation regulations.—With the exception of coasters on predetermined schedules and ships having diplomatic clearance, navigation of the territorial waters of the Pelóponnisos and the adjacent islands to a distance of from 1 to 5 miles

offshore is restricted, and the control of navigation therein is exercised by the Greek Navy. The ports of Kalámai, Koróni, Navarínon, Katákolon, Killíni, Pátrai, Aíyion, and Kórinthos are declared ports of refuge where vessels may touch freely.

CAUTIONS

GENERAL

1-23 Because of the generally unsettled political conditions and those of reconstruction existing in the area embraced by this publication, certain information regarding government authority, regulations, prohibited areas and the like, should not be considered up-to-date. Much data of doubtful present validity have been retained to provide background information that may be helpful in some circumstances.

Firing and bombing practice may take place in areas within the limits of this volume. In view of the responsibility of the range authorities for avoiding accidents, the limits of the practice areas will not be shown on the charts nor will they be described in the sailing directions. Any lights, beacons, or buoys that might serve as navigational aids or any targets that might constitute a navigational hazard will, however, be shown and described. The lights will also be carried in the light list.

A vessel aware that firing or bombing practice is taking place should avoid passing through the practice area. Should a vessel find herself in such an area when practice is taking place, she should maintain her course and speed, and all persons on board should take cover.

Caution with regard to single ships approaching squadrons or aircraft carriers.—The attention of mariners is called to the danger to all concerned which is caused when a single vessel approaches a squadron of

naval vessels or merchant ships in convoy so closely as to involve risk of collision or attempts to pass ahead of or through such a squadron or convoy. Mariners are therefore warned that a single vessel should take early action to keep out of the way of a squadron or convoy.

Attention is also directed to the uncertainty of the movements of aircraft carriers, which must usually turn into the wind when aircraft are taking off or landing.

Submarine cables—Danger.—Submarine cables are laid within the area covered by this publication. In view of the serious consequences resulting from damaged submarine cables, vessels should take special care to avoid anchoring or fishing in cable areas.

Vessels fouling a submarine cable should attempt to clear without damaging the cable. Anchors or gear that cannot be cleared should be slipped and abandoned, and no attempt should be made to cut a submarine cable. Certain cables carry high voltages, and serious injury or loss of life may result from attempting to cut a submarine cable.

Article 7 of the International Conference for the Protection of Submarine Cables, Paris, 1884, is quoted below:

"The owners of vessels who are able to prove that they have sacrificed an anchor, a net, or other fishing gear, in order not to damage a submarine cable, may be compensated by the owner of the cable.

"In order to establish a right to such compensation it is necessary, if possible, immediately after the accident, to draw up a report confirming the loss, supported by the testimony of the men in charge of the equipment; and the master of the vessel, within 24 hours after his arrival at the first port of return, or of call, to make his report to competent authorities. They will notify the consular authorities of the country of the owner of the cable."

Drilling Operations—Seismic prospecting and drilling operations are carried out off the Italian Adriatic coast, and framework oil rigs may be encountered some distance offshore.

NAVIGATION

1-24 Navigational aids described in this publication should not be considered reliable in all areas, and changes in them may occur without notice. Vessels should consult Notices to Mariners, Hydropacs, and Hydrographic Office Special Warnings at all times.

The navigational information given in this publication is totally independent of political restrictions or remaining wartime dangers, and relates only to navigation safe from natural dangers.

Danger areas.—Because of mines and dangerous wrecks, the coastal waters described in this publication may be declared danger areas. Special routing instructions and information on such matters as special pilotage, degaussing, navigational aids, and special warnings for the danger areas are given in NEMEDRI (Northern European and Mediterranean Routing Instructions), which must be consulted.

Magnetic Anomalies—Magnetic anomalies exist off the Yugoslav coast northward of 44°00'N., between Stonski kanal and Split, and near the off-lying island between Vis and Jabuka.

WIND AND WEATHER

GENERAL REMARKS

1-25 The Adriatic Sea is an arm of the Mediterranean which is cut off from the rest of the Mediterranean by the Italian peninsula and further isolated meteorologically by the Apennines and the Dinaric Alps. Sea level access to this area by air masses is available only through the relatively narrow Strait of Otranto.

The climate is a type generally called Mediterranean which is defined as having hot dry summers and cool moist winters. This type is best developed in the southern portion of the Sea while the northern portion becomes more continental as shown by the colder winters and moister summers.

PRESSURE

1-26 Average pressure over the Mediter-

anean is largely controlled by the "centers of action"—the semi-permanent *HIGHs* and *LOWs* of the Atlantic and Asia. In winter the Mediterranean lies between the Asiatic *HIGH* and the weakened Azores *HIGH*. The warmth and moisture of the air over the Mediterranean contribute to the formation and intensification of migratory *LOWs* that pass to the eastward. In summer the Mediterranean lies between the Azores *HIGH*, which is now strong and farther north than in winter, and the southern Asiatic *LOW* and North Africa *LOW*. In the absence of a moving cyclonic disturbance, this pressure distribution gives rise to northwest winds over most of the Mediterranean.

In the Adriatic the weather is not as apt to stay settled as it is farther east or south. Except for the Golfe du Lion the Adriatic has as variable weather as any place in the Mediterranean.

Frontal systems.—Most of the *LOWs* in the Mediterranean form as secondaries to depressions whose primary centers are farther north. These secondaries form in the troughs or along the cold fronts which may enter the Mediterranean either over Spain or across southern France. Having formed, the *LOW* normally moves eastward or northeastward. From the Golfe du Lion the usual course is southeastward across the Tyrrhenian Sea or eastward across Italy to the Adriatic.

The *LOWs* which move into or form in the Adriatic usually tend to move eastward, frequently going southeastward following a course over water, but sometimes directly crossing the mountains to the east and passing over the Balkans or moving to Central Europe.

The wind and weather of the Adriatic in winter is powerfully influenced by the *LOWs*, *HIGHs* and frontal systems whose primary centers are farther north. These systems do

not necessarily set up separate circulations in the Mediterranean. For instance, the Asiatic *HIGH* may spread westward over Europe and from its central area there may be a general outpouring of cold air. This gives the bora (sec. 1-28) over the Adriatic without the passage of a *LOW*. Similarly other systems may be dominant enough to completely control the circulation over the Mediterranean.

In the Mediterranean *LOWs* occur at all seasons. The seasons in order of decreasing frequency of disturbances are: spring, winter, autumn and summer.

AIR MASSES

1-27 The characteristics of the air masses encountered over the Adriatic depend on the source region, the path traversed to reach the Adriatic, and the time of year.

Arctic air, encountered in winter, originates over the Arctic Ocean and may reach the Adriatic by passing (1) over the British Isles, France and the west Mediterranean, or (2) over central Europe. This air is cold, is of average humidity or less if it arrives by (1) and very dry if by (2), and is sometimes the constituent air of the bora.

Continental polar cold air originates over Asia or east Europe in winter, reaches the Adriatic as a bora, and is cold and dry.

Continental tropical air originates over North Africa as a dry, hot and sometimes dusty air mass. If it crosses the Mediterranean slowly it picks up considerable moisture in the lower layers by the time it reaches the Adriatic; if it moves more quickly it acquires correspondingly less moisture. This is the usual air mass of the *sirocco* (sec. 1-30).

There are several other minor sources of air. Any air masses that pass over the Mediterranean are modified by its warmth and moisture.

BORA

1-28 The bora is an east-northeast or northeast wind, cold, dry, sometimes boisterous, in the Adriatic Sea. It must be anticipated with respect by mariners since it may raise high seas and make many coasts dangerous. Its extreme effect on land can be seen on the eastern slopes of Ostrvo Cres where vegetation is scanty and there are few inhabitants. The bora is the predominant wind of the north portion of the Adriatic Sea in winter.

Two principal pressure patterns give rise to the bora; however, the bora is not exclusive with these. The first of these is the ordinary migratory *LOW*. The wind of the cold sector of the *LOW* usually turns out to be the bora. Apparently this is the easiest way for the cold air to cross the Alps. After the passage of the *LOW* there is frequently a favorable pressure gradient for the continuance of the bora and cold air keeps pouring over the mountains and across the Adriatic for perhaps a week, in some cases even longer. If there is an occlusion over the northern portion of the Adriatic the bora may begin during foggy, overcast weather with snow or rain. With the passage of the fronts the weather clears and the bora may blow strong for one or two days.

*LOW*s most frequently traverse the northern Mediterranean in early winter and early spring, and these *LOW*s bring to the northern Adriatic its foulest weather. In mid-winter these storms seem to prefer the southern Meriterranean or North African paths.

The second principal pressure pattern giving rise to the bora is characterized by pressure building up over eastern Europe, especially the Balkans, until there is pressure gradient enough to cause an outflowing of air over the mountains. The cold front at the advancing edge of this cold air mass

produces violent squalls followed by gales, but heavy clouds and rain or snow are not present. This type of bora is apt to last for several days and is said on rare occasions to have been almost continuous for 30 days.

This type of bora is usually indicated by white clouds over the mountains. The air which comprises this bora is usually of continental origin and contains little moisture but there is frequently enough moisture to make white clouds when it rises to pass over the mountains.

The synoptic situation illustrated in figure 1 shows an unusually well developed bora. A *HIGH* moved from the British Isles to northern Germany and intensified. With this movement a cold front, which originally extended from Austria to the Black Sea, moved southward and westward, a portion of it crossing the Adriatic, and extended most of the length of the Mediterranean. The cold arctic air following this front has produced a bora with winds of force 5 to 10. Temperatures at the time of this observation were all above freezing.

If the bora is preceded by clear weather, a condition that obtains more frequently in winter than in summer, the humidity usually remains low and the sky clear; but if it is preceded by a scirocco, as is usually the case, it is ordinarily accompanied by thunderstorms in the summer and snow squalls in the winter.

The bora occurs chiefly in winter and more frequently attains the force of a storm wind toward the end of October and in December, January, and March. In rare instances violent bora winds have also occurred in May. Their frequency, however, varies from year to year; in some years there have been no marked bora storms while in others such storms have lasted for almost an entire month. In summer the bora seldom lasts more than one day, sometimes only a few

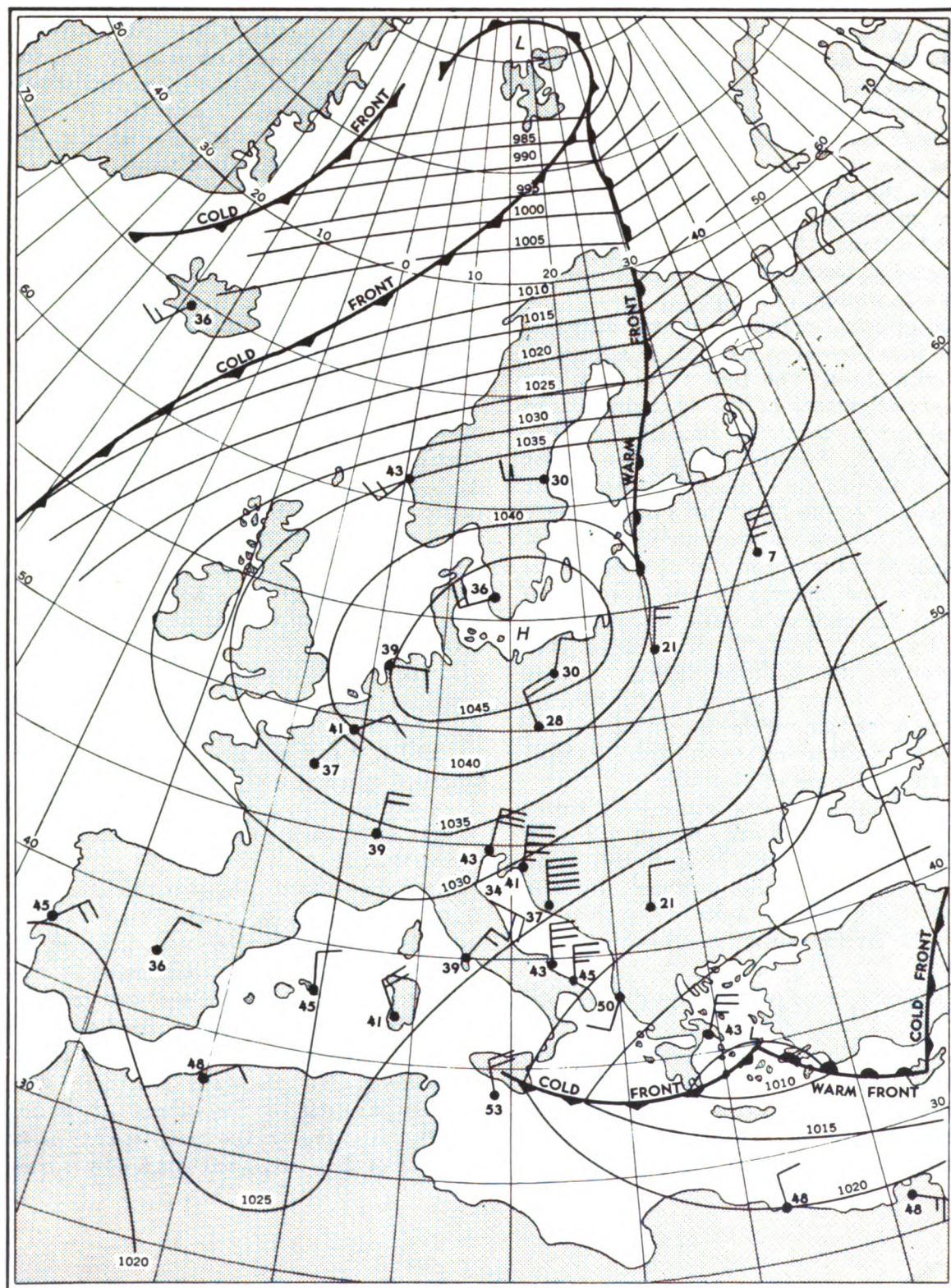


Fig. 1 BORA. Synoptic situation at 1300Z February 13, 1934.

hours; in winter, however, it may last for several weeks with temporary lulls.

1-29 The approach of the bora is often indicated by the formation of clouds on the summits of coastal mountains, especially those on the northeastern side of Velebitski Kanal. The lower edges of such cloud formations are usually very clearly defined. When small clouds are seen to break off and disappear while the peaks of the mountains remain enveloped in thick clouds, the bora may be expected at sea in a short time inasmuch as this condition usually indicates that that wind is already established along the coast. In the warm season, after southeasterly breezes, the formation of dense storm clouds with lightning flashes among them, accompanied by a rise in the barometer, are reliable indications of the sudden approach of a bora.

In all seasons the bora is generally followed by clear cold weather with slight or moderate winds from the northwest. If a bora has been preceded by heavy snow storms or if the sky begins to clear soon after its approach the bora may be expected to last but a very short time. The wind then backs to the southeast, cloudy skies and precipitation follow, and the barometric pressure south-eastward of the storm area rises.

The principal localities where the bora blows with violence are the Gulf of Trieste, Velebitski and Tihi Kanal, the region around Šibenik and Rt Ploča, Brački Kanal, Zaton Žuljana (Žuljanski Zaliv), and Pellj i Drinit. It is more moderate on the western side of Istria, in Zadarski Kanal, leeward of Dugi Otok and Ostrvi Kornat and Molat and along the coast between Cavtatska Luka and Oštri Rt.

SCIROCCO (SIROCCO)

1-30 The sirocco, called the scirocco by the Italians and called the jugo by Yugoslavians, is, after the bora, next in importance to shipping. This is the south or southeast

wind characteristic of the warm sector of a Low. The air usually originates over the Sahara and consequently begins as a hot, dry wind. In passing over the Mediterranean, however, it acquires moisture, the amount depending on the temperature and the time the air is over the water.

It is generally less violent and more steady than the bora. It may give rise to considerable sea, especially in restricted areas along the east coast of the Adriatic. The scirocco occurs more frequently and for longer periods over the southern portion of the Adriatic than the northern portion.

The duration and extent of the scirocco associated with a *LOW* is partly dependent on the course and rate of movement of the *LOW*. If the *LOW* takes a path across northern Italy the scirocco may extend the entire length of the Adriatic. This path is most frequent in early winter and early spring. When the frontal system is farther south the scirocco may not penetrate far north of the Strait of Otranto, and in this case the bora may blow over the full length of the sea on the approach and passage of the fronts. The *LOW*s take this southern course most frequently in midwinter. The *LOW* that moves southeastward down the Adriatic will probably be accompanied by more bora than scirocco.

A *LOW* north of the Alps, when it is associated with a *HIGH* to the east, may cause a scirocco the entire length of the Adriatic Sea, the duration of the scirocco depending on the speed of movement of the primary pressure system.

There are two types of scirocco, the cyclonic induced by a *LOW* and the anticyclonic associated with a *LOW* and a *HIGH* which differ both in origin and in accompanying weather conditions.

The cyclonic scirocco is a wind varying from a moderately fresh breeze to a gale,

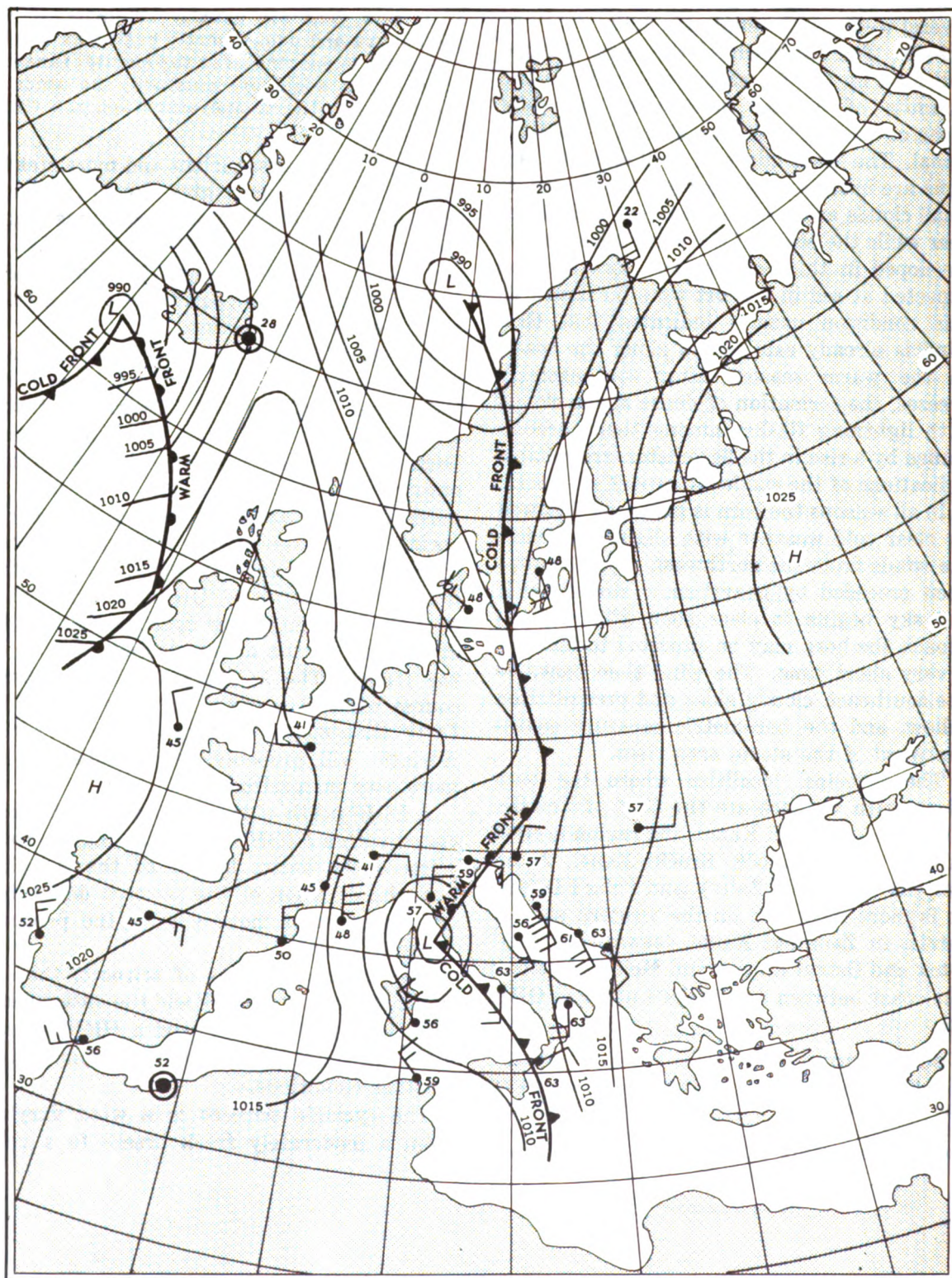


Fig. 2 SCIROCCO. Synoptic situation at 0600Z April 26, 1949.

sometimes with squalls; when this wind is blowing the sky is usually covered by dense, low-lying clouds and there is an intermittent rainfall which is at times very heavy. It occurs chiefly when a primary *LOW* nears the Adriatic or a secondary *LOW* forms over the Golfo di Genova or the northern Adriatic.

The anticyclonic scirocco, which occurs frequently in spring, at the beginning of summer, and in autumn, is produced by the combined effects of a marked *LOW* that remains stationary for a considerable time in the northwest, and a *HIGH* to the east or southeast. Under these conditions the wind is moderately fresh and constant for several days and raises a heavy sea; when this scirocco is blowing the sky usually remains clear and the barometer high.

A well developed scirocco is illustrated by the synoptic situation of April 26, 1949, shown in figure 2. Here a secondary over the Golfe du Lion has developed on the cold front of a *LOW* centered off the coast of Norway. The Adriatic lies in the warm sector of the secondary. Winds of force 3 to 4 are reported on the Italian coast, and of force 6 to 9 on the east coast. The sky was generally cloudy but rain was not occurring at the time of this observation.

1-31 An approaching scirocco is generally preceded by a calm or by light, variable breezes, by swells from the eastward or southeastward, and by the formation of mist to the south. This mist is condensed by the advancing wind into low, loose clouds which accumulate on the sides of the mountains and eventually envelope the peaks. The sky gradually becomes covered with low dense clouds of a leaden color and visibility decreases. Temperature and humidity rise and the sea increases from the southeast. The approach of a scirocco is almost always indicated by the movement of the clouds toward the northwest.

There are local signs which indicate the scirocco. Since this air contains considerable moisture, heavy clouds form when it is deflected upward by mountains. At Venezia they look for heavy clouds over the Friuli Mountains. In the Gulf of Quarnero dark clouds on Vrh Ucka (Monte Maggiore) (sec. 11D-28) and the development of clouds on Vrh Osor (sec. 11D-10) and on Vrh Pleševica (Velebit) (sec. 11C-11), as well as a south-east swell, indicate the scirocco.

The direction and effect of the scirocco may be modified by the lay of the land. In the Gulf of Trieste, for example, the scirocco is less frequent than the bora and seldom attains great force. Here its danger lies in the fact that it frequently brings fog dense enough to render navigation difficult, and that through persistence it may raise the water level of the gulf. In the Gulf of Quarnero the scirocco usually brings thick weather and blows up a high sea.

Although the scirocco occurs in all seasons of the year it has its maximum frequency during the months from March to June in the northern Adriatic and in autumn and late winter in the southern Adriatic and off the coast of Greece. In the latter locality the anticyclonic scirocco blows frequently in July and August. The scirocco, as a rule, does not last longer than three days in summer but it may continue, with but few short intervals, for as long as three weeks in the winter.

Notwithstanding its force and long duration, the scirocco is not as dangerous as the bora in the Adriatic. It usually blows with almost constant force and it is generally possible, in case of necessity, for vessels to reach shelter. Because of the high sea that it raises and of its tendency to veer suddenly to the southwestward, however, the scirocco may become dangerous in the northern part of the Gulf of Venice and off the coast be-

tween Cavtatska Luka and Kep i Gjuhëzës ($40^{\circ}26' N.$, $19^{\circ}18' E.$) and especially in the vicinity of Boka Kotorska.

It very frequently happens that the bora may become well established in the northern Adriatic at the same time that the scirocco is blowing in the southern part. As a rule the boundary area between these two winds lies somewhere in the vicinity of Ostrvo Vis. If the *LOW* follows a more northerly course the bora may blow only in the Gulf of Trieste or the scirocco may even prevail over the entire Adriatic. Sometimes, however, the path of the *LOW* changes to the southward where the scirocco is blowing and causes a change from the scirocco to the bora.

1-32 The transformation of the scirocco into a bora depends upon the expansion toward the Alps and the northwestern part of the Balkan Peninsula of a well-developed central European *HIGH*. In that event the *LOW* that caused the scirocco is forced to withdraw toward the southeast. The transition, especially in the northern Adriatic, often occurs with great violence, and a moderate scirocco very frequently changes into a bora of storm force. The transition is marked by a fall in temperature and by heavy rainfall which eventually changes into snow, but the humidity rapidly decreases, even though the sky may remain partially or entirely overcast. The barometer usually begins to rise even before the bora becomes established.

The scirocco, however, veers to the south and southwest more frequently than to the east and northeast; this is especially true in the autumn when the frequency with which it veers is about twice as great as that with which it changes into a bora. Before veering to the southwest the scirocco freshens, usually with a falling barometer, until it attains a maximum force which is marked by a tempestuous squall. The wind then

veers to the northwest, rapidly losing force, and then backs again to the southwest. The precipitation usually diminishes as the wind from the southwest becomes established, and the clouds scatter rapidly. Variable and colder weather follows with moderately fresh winds from the southwest to northwest; the barometer remains unstable for some time and then begins to rise slowly.

If the *LOW* that caused the scirocco remains stationary in the northern Adriatic, the veering of the scirocco to the southwest and northwest is often merely a local phenomenon indicative of the approach of the bora which appears after a few hours or as soon as the *LOW* has begun to move south-eastward.

LOCAL AND OTHER WINDS

1-33 In the northern Adriatic winds are frequently referred to, not by direction, but by specific names. These names and abbreviations are:

N	Tramontana	T
NNE		TG
NE	Greco	G
ENE	Bora	GL
E	Levante	L
ESE		LS
SE	Scirocco	S
SSE		SO
S	Ostro	O
SSW		OL
SW	Libeccio	Lib
WSW		LP
W	Ponente	P
WNW		PM
NW	Maestrale	M
NNW		MT

The bora and scirocco have already been discussed. The other winds are of less general importance although locally any one may be significant. Maestrale gales average

something on the order of one a month. They are not so violent nor is their onset so sudden as that of the bora.

Many times in local reference to the winds the direction is not as finely specified as the table would indicate: thus, bora may mean a wind from NNE to E.

Land and sea breezes will be experienced during most of the year, especially in summer, on approach to the coast. On the west coast these winds behave in the conventional manner; land breeze at night ending about midmorning, sea breeze from midmorning until about sunset. On the east coast, however, the mountains modify this regime so that the land breeze is stronger and lasts longer than the sea breeze. The west slopes of the mountains, especially when snow covered, so effectively cool the air that land breezes may persist until noon and, during their height, be considerably stronger than the sea breezes at their height.

Strong winds.—As is indicated by other meteorological conditions, strong winds of force 6 or higher are most frequent over the Adriatic in winter, the next highest frequency occurring in autumn, a little less in spring, and least in summer. The frequency of strong winds in the different seasons is in approximately the following proportion: Winter 7, autumn 5, spring 5, summer 1.

In winter about half the strong winds are from northeast or east, the next most frequent direction being southeast. In autumn northeast and east are still most frequent, but southeast and south occur almost as often. These autumn winds are mostly confined to the northern two-thirds of the Adriatic. In spring strong winds are usually from the north, and strong northeast and east winds occur with about the same frequency as strong southeast and south winds. In summer strong winds are very unusual;

only occasionally is the scirocco able to attain force 6.

Data on high winds at individual stations are contained in the meteorological tables in the appendix. Like the fog data, wind data are for differing periods and to differing limits so that they are not comparable between stations but should be consistent within themselves so that relative monthly frequencies are indicated.

FOG

1-34 Fogs occur over the entire Adriatic but are much more frequent in the north than the south, and are more frequent in the winter than the summer. Fogs are produced by the scirocco when this warm moist air current passes over the cool water of the northern portion of the Adriatic. This type of fog is most frequent in winter and spring. Radiation fog occurs in the presence of moist calm air under clear night skies. This type of fog is fairly common in the northern Adriatic and is most frequent in autumn and winter. Fog is also formed over the Adriatic by the mixing of moist and cold air. This type of fog may accompany the passage of a weak cold front, the onset of a bora, or with a cold north, northwest or west wind. Mixing fogs are almost entirely confined to the winter season.

Each location has its own characteristic fog conditions. A few are mentioned:

Ancona.—Fogs are frequent and dense during calms in winter. They are frequent in the evening as well as in the morning. Seasonal average of number of days with fog are: Winter 23, spring 7, summer 2, autumn 10.

Venezia.—Fogs are frequent in winter on the approaches to Venezia. Usually the fog dissipates after the early morning, but may last all day.

Trieste.—Fogs so extensive as to render navigation difficult are more frequent in the Gulf of Trieste than in any other place on the eastern shore of the Adriatic. The fog forms with greatest frequency in the winter months, but it also occurs frequently in other months in limited areas over the sea, especially in the morning, in such a way as to make it impossible to recognize even the more conspicuous landmarks on the coast. It is usually dispersed about noon or shortly thereafter. Fog is most frequently due to nocturnal radiation during calm weather after the arrival of moist air. It may also occur with weak cold fronts, bora or north-west winds.

Zadar.—Spring is the foggy season. Most frequently the fog is of the radiation type during periods when southeasterly winds have transported moist air to the north Adriatic; at times the fog is associated with drizzle in stagnant cold air. Fog and strong bora may occur simultaneously.

The fog data given in the meteorological tables are not strictly comparable since they come from various sources and periods. However, the data for each station should be consistent with itself and indicate the relative monthly incidence compared with the annual total.

PRECIPITATION

1-35 In general, summers in the Mediterranean are dry and the winters moist. This holds for most of the Adriatic and the west coast of Greece, the drought of summer becoming more pronounced to the southward. From the central Adriatic southward there are only two or three days a month during July and August with rain. Northward from the central Adriatic winter rainfall becomes less and summer rainfall more in proportion to the annual total. Table 1, with stations arranged from north to south, shows the extent of this variation:

TABLE 1.—*Precipitation (inches) Adriatic Coast by Seasons*

	Winter	Spring	Summer	Autumn	Annual Mean	
					E. Coast	W. Coast
Trieste	7.83	9.53	10.87	14.80	42.99	...
Venezia	5.08	7.28	7.72	9.06	...	29.13
Ancona	6.65	6.06	4.72	9.65	...	27.09
Split	9.02	9.02	5.00	11.50	34.53	...
Hvar	9.69	6.73	3.86	10.67	30.94	...
Boka Kotorska	13.11	10.67	3.78	10.79	38.35	...
Palagruž	5.08	4.65	1.81	5.00	...	...
Durrës	13.58	7.83	4.29	16.72	42.48	...
Bari	7.09	5.28	2.76	7.13	...	22.24
Brindisi	10.00	6.06	2.52	8.58	...	27.16
Kérkira	20.51	8.78	2.09	17.36	48.74	...

TABLE 2.—*Percent of Annual Precipitation by Seasons*

	Winter	Spring	Summer	Autumn
Trieste	18	22	25	35
Venezia	18	25	26	31
Ancona	25	22	17	36
Split	26	26	15	33
Hvar	31	22	12	35
Boka Kotorska	34	28	10	28
Palagruž	31	28	11	30
Durrës	32	18	10	40
Bari	32	24	12	32
Brindisi	37	22	9	32
Kérkira	42	18	4	36

Table 2 shows that while about 25 percent of the annual rainfall occurs in summer in the northern Adriatic, Trieste and Venezia, only about 4 percent of the annual rainfall occurs in summer off the Greek coast at Kérkira. In many areas autumn is the rainiest.

A glance at the annual totals of precipitation on the east and west coasts shows that the east coast is much rainier than the west. This is accounted for by the fact that the scirocco, which is the moisture bearing wind, crosses the east coast rather than the west, and by the fact that the coastal mountains induce rain by causing the air to rise and pass over them. In the usual movement of storms a warm front passes northward over the Adriatic, giving heavier rains on the east than on the west coast. Clearing weather comes with the passage of the cold front which usually moves across Italy. Thus the west coast frequently clears before the east coast, the east coast having precipitation longer. In fact, between the east coast of the Adriatic and the coastal mountains is the rainiest portion of Europe.

Thunderstorms are most frequent in the northern portion of the Adriatic in summer,

when they occur on three to six days a month. To the southward the frequency is a little less and the season of the maximum shifts to autumn.

TEMPERATURE

1-36 The annual march of temperature in the northern portion of the Adriatic shows the continental influence by varying over a fairly large range, while the temperatures of the southern portion are modified more by the Mediterranean and the annual range is smaller. Thus, despite the difference in latitude, the summer temperatures of the extreme north are almost as high as those of the south, and the winter temperatures are considerably lower. For example, the mean temperature at Venezia in July is 76° F., while the means at Brindisi and Vlonë are 78° F. and 77° F., respectively; but the mean for January at Venezia is 37° F. compared with 54° F. at Brindisi and 48° F. at Vlonë. The Dalmatian and Albanian coasts have relatively mild winters, the lowest monthly mean temperature being about 45° F.; but since the region is subject to the bora it may have sudden and very large changes between scirocco and bora winds.

In the middle of the eastern shore frost is rather rare, and further south it is seldom experienced. In the cold waves of the bora the temperature may occasionally fall considerably below freezing, even Palagruž having recorded 28° F.

During the winter, the lowest temperatures occur with NE winds, and the highest with scirocco winds; the cool winds of summer, on the other hand, are NW and NNW, but the scirocco from SE and SSE remain the warm winds. The character of both the NE and SE wind varies; hot winds from the same direction as the bora may blow down from the mountains, and the winds from the

SE may originate from the Adriatic region itself, and be relatively cool.

OCEANOGRAPHY

TIDE

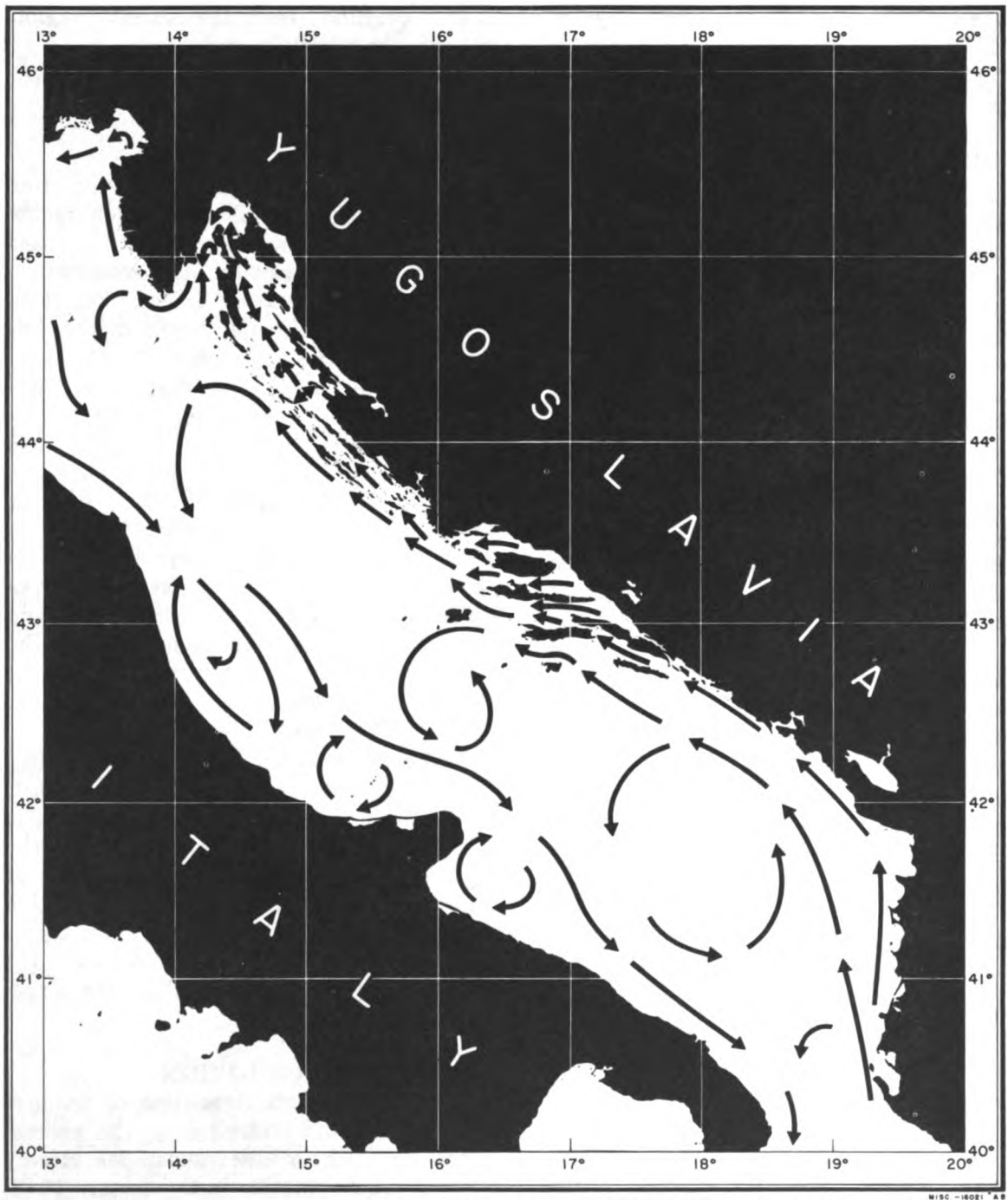
1-37 The tide along the Adriatic coast of Yugoslavia is largely diurnal in character except for the southern portion of the coast where it is semidiurnal. Tidal ranges are small and hardly exceed 1 foot. Yet it is not uncommon for water levels in the Adriatic to change by as much as 6 feet.

Changes in water level that exceed the tidal range are in general due to the effects of atmospheric pressure and wind. The greatest range is produced by the scirocco (sec. 1-30). A' strong scirocco blowing at Venezia will raise the sea level as much as 6 feet. When a strong northerly wind is blowing there the sea may recede so far as to uncover the lagoons along the shore. Land winds like the bora frequently lower the water level along the eastern shore of the Adriatic and along the leeward side of the islands of that area.

Tidal currents.—Because of the small tidal range, tidal currents seldom exceed 0.5 knot. On the flood, these currents flow northwestward along the Yugoslavian coast and in the opposite direction on the ebb. The effect of the tidal current on the general circulation in calm weather in the Adriatic is merely to strengthen and weaken alternately the northwesterly drift current along the Yugoslavian coast.

GENERAL CIRCULATION

1-38 The general circulation of the Adriatic (fig. A) is controlled by the general circulation of the Mediterranean Sea. Highly saline water originating in the eastern Mediterranean finds its way northward through Stenon Kérkiras and into the Adriatic



General Circulation of Currents in the Adriatic Sea.

through the western side of the Strait of Otranto. This warm water drifts northwestward along the Yugoslavian coast with a speed of about 0.5 knot in open water and considerably greater speed in the channels formed by the many islands along the coast. The speed of this current is also increased to some extent by the discharge of rivers. The combined tidal flood and drift current often attains a rate of 1 knot along the open coast and in the larger channels. In the narrower channels it often exceeds a velocity of 1.5 knots.

SEA TEMPERATURE

1-39 Surface temperatures along the Yugoslavian coast during the early part of the year decrease to northward. For example, average sea temperatures off the southern part of this country, as shown in figure B, are 57° F. They diminish slowly northward and are 54° F. in the vicinity of Dubrovnik. From here northward to the parallel of Split there is little change, presumably because of the topography of the area. A large eddy is formed by deflection of the current to westward by the island group of Mljet, Korčula, and Vis. This eddy rotates counter-clockwise and is deflected eastward by Promontorio del Gargano, (fig. A). Northward of this eddy the diminution of temperature is more rapid. The sea temperature reaches a minimum of 45° F. in the Gulf of Venice.

By May (fig. B) the latitudinal change in sea temperature is more gradual and is confined mostly to the southern part of the coast, except that now there is an increase of temperature northward. Along most of the coast north of the parallel of 43° N., the temperature is close to 65° F. and rises only to 66° F. in the Gulf of Venice.

By August when temperatures are high, there is hardly any latitudinal gradient

of temperature and the range is only 2° F. (75° F. to 73° F.) all along the Yugoslavian coast; the temperature again decreases northward.

By November and December, figure B shows there is considerable diminution in temperature but that temperatures are still above the minima recorded in February. Northward of Split there is a more noticeable latitudinal change in temperature, as far as the southern end of Istria. Northward of this position the isotherms run northward through the Gulf of Venice; the sea temperature increases shoreward.

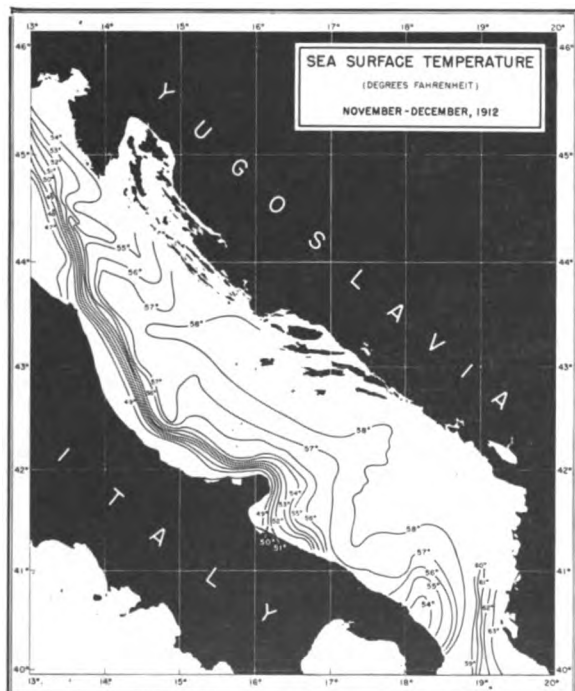
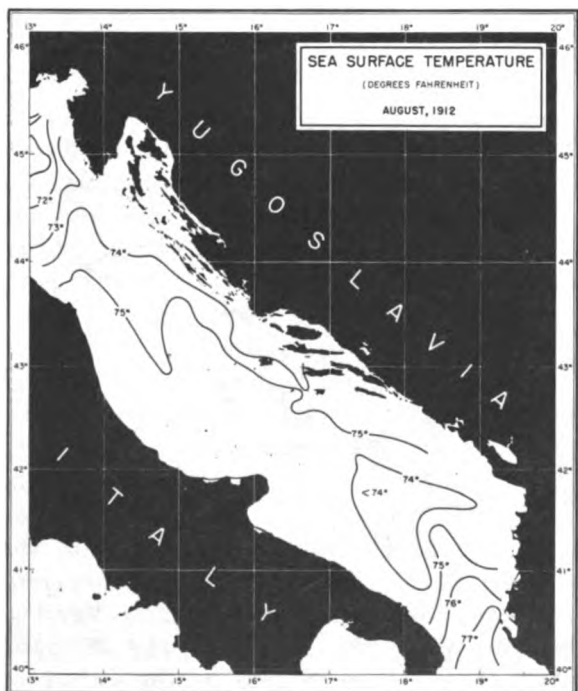
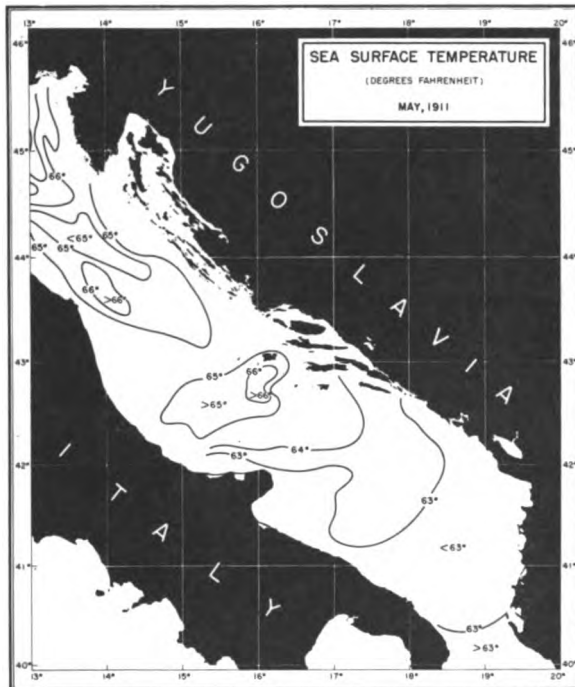
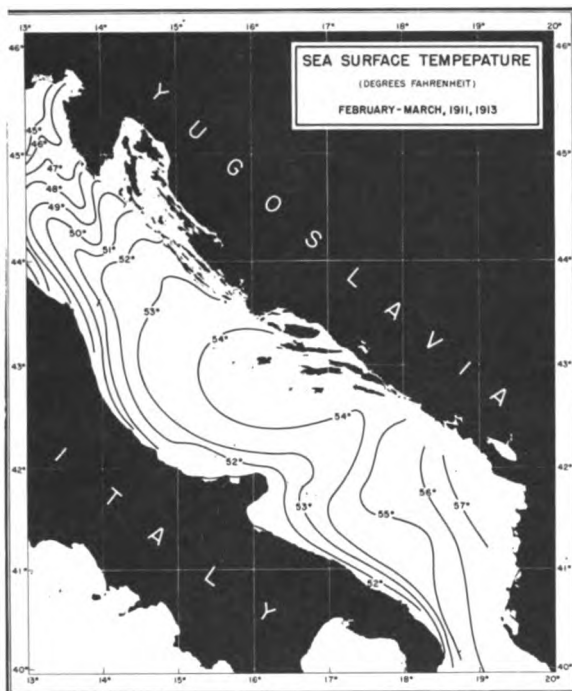
The large thermal gradient in the surface water along the Italian coast during this period is worth attention. This condition extends as far southward as Bari and is the result of the warm Mediterranean water turning counterclockwise to the westward and meeting the colder fresher outflow of the large Italian rivers that drain into the Gulf of Venice and follow the Italian coast.

ICE

1-40 It should be noted in the charts of temperature distribution that the minimum temperatures in February along the Yugoslavian coast are all above freezing, so that generally no ice formation is to be expected. However, in the shallow inshore areas, especially where there is fresh water runoff, thin pancake ice may form, but disappears quickly with diurnal heating. In the northern areas ice formation along the shore is more extensive and in very severe winters the canals of Venezia freeze over.

SALINITY

1-41 The distribution of salinity of the Adriatic Sea is also the result of the current regime. The warm highly saline Mediterranean water which enters the Adriatic through the eastern side of the Strait of



Otranto flows first along the Yugoslavian coast, where it maintains the salinity at a value near 38 parts per thousand. As this Mediterranean water turns counterclockwise toward the Italian coast, it mixes with the southward-flowing fresher water supplied from the large Italian Rivers in the north. This mixed water has a somewhat lower surface salinity than that on the eastern side of the Adriatic. This distribution is most apparent on the November-December chart for salinity (fig. C) and is still apparent, though to a lesser extent, on the May chart.

Lowest salinities are found to northward in the Gulf of Venice near the mouths of the large rivers. The minimum value, 20 parts per thousand, is shown on the February chart. In the northwestern part of the Gulf of Venice, however, the salinity remains generally above 35 parts per thousand throughout most of the year. The lower salinity values toward the western side are explained by the fact that the coriolis force deflects the outflow of the northern Italian rivers that empty into the gulf southward where the outflow continues along the western side of the Adriatic.

SPECIFIC GRAVITY

1-42 Except in the northern part, salinity varies little in the Adriatic, either with location or season. Surface temperature, however, has a seasonal range of about 20° F. It is this range in surface temperature that is responsible for the seasonal change in specific gravity of the surface water. During the colder months the specific gravity of the surface water is close to a value of 1.028. Close inshore it may be somewhat less. In July and August when the temperature is about 20° F. higher than in winter, the specific gravity of the surface water falls to about 1.026 over most of the area. In the northern parts of the Adriatic, where

the efflux of the large Italian rivers dilutes the sea water, the specific gravity of the surface layer may fall below the value of 1.020.

ELECTRICAL CONDUCTIVITY

1-43 As with the specific gravity, values of electrical conductivity similarly show the effect of temperature between summer and winter. In the open sea off the Yugoslavian coast, the conductivity varies from low values of about 0.040 reciprocal ohms per centimeter cube to high values of about 0.060 during summer.

WATER COLOR AND TRANSPARENCY

1-44 Water off the coast of Yugoslavia is clearer and bluer than the water off the coast of Albania. It is also high in transparency especially in spring and summer. This is evident from figure D. Off the extreme southern part of the coast of Yugoslavia, a white disc is visible for more than 200 feet below the surface in spring and summer. In winter the transparency there is reduced to about 90 feet. For most of the coast the transparency is generally a little more than 80 feet and in spring and summer it is well above 100 feet. Near the river mouths and in the shallow inshore areas transparencies will be lowest and water color from green to yellow.

BOTTOM SEDIMENTS

1-45 The bottom of the Adriatic is principally composed of sand. In the deeper portions of the sea southward of Ostrvo Kornat there is a large patch of mud bottom that lies close to the westernmost islands. Southward of the islands lying between Otočić Blitvenica (sec. 11A-6) and Šibenik (sec. 11A-14) the mud bottom lies close to the mainland. Sand is also the predominant sediment between the islands. An exception to

this is the larger portions of Pašmanski-Zadarski Kanal (sec. 11A-31), and smaller portions of Srednji Kanal (sec. 11A-48) where mud bottom is found. Rock bottom is characteristic around most of the islands of the area and extend beyond the axes of the islands. Cliffs are especially abundant between Dugi Otok and Ostrvo Kornat as well as between Ostrvi Kornat and Žirje.

SEA AND SWELL

1-46 The terms sea and swell refer to the wind areas in which the waves are generated. Sea is generated by the local wind and swell refers to waves that have left the area in which they were generated. Fetches are small in the Adriatic except along its axis. Therefore, the waves generated will be mostly sea. Seasonal winds over the Ad-

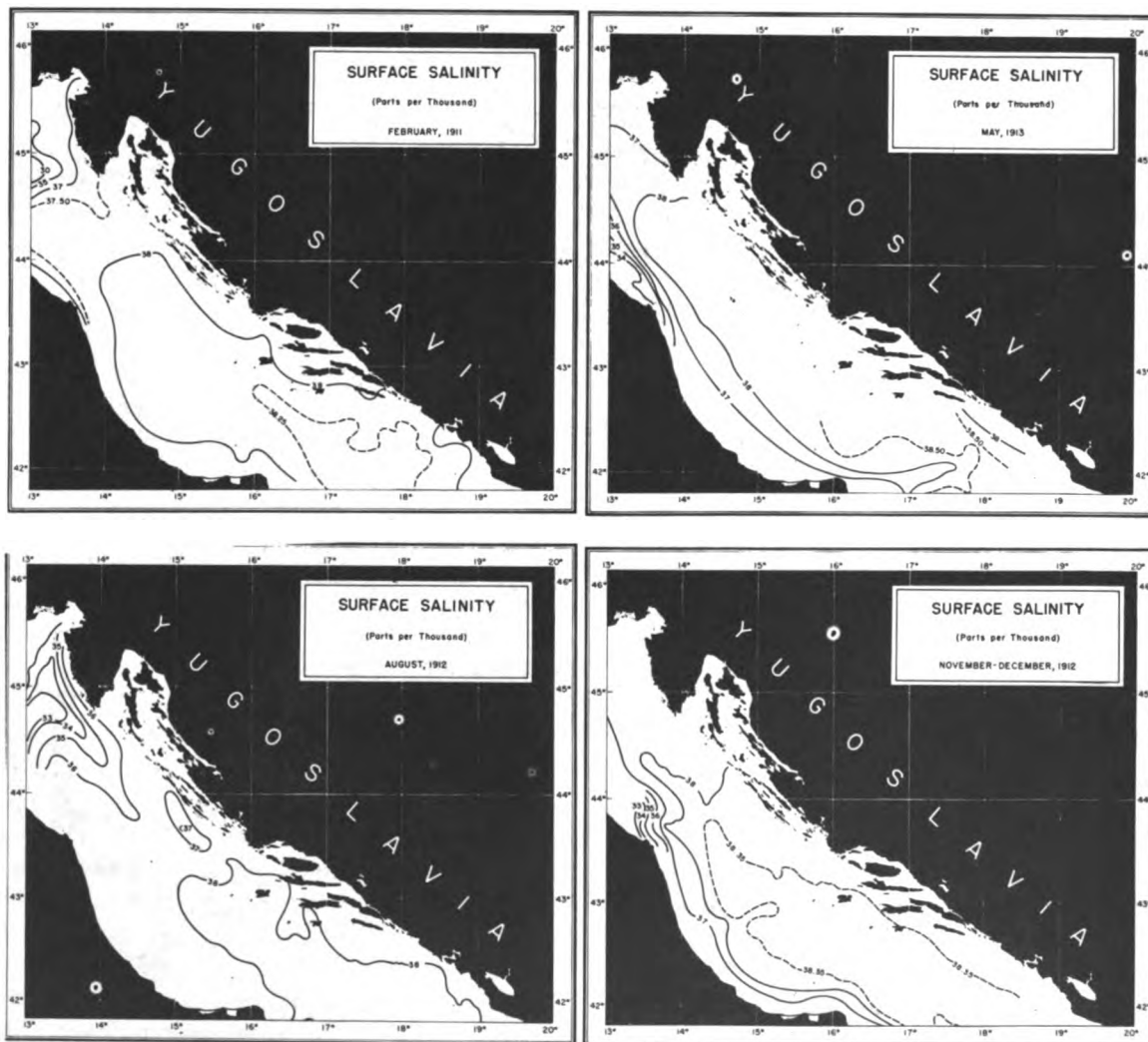


FIGURE C.

riatic give a pronounced seasonal character to the sea and swell. Land and sea breezes, however, especially in summer, alter greatly the local character of the sea.

Spring.—During this season the bora weakens in intensity. Nevertheless, it is sufficiently strong to create considerable sea over the whole Adriatic and considerable swell in the southern portion. As apparent from figure E, sea and swell will be predominantly from the northwest. Swell from this

direction will affect the Albanian coast most. Therefore the beaches of this country will be most exposed to surf and should be subject to strong along-shore current.

Summer.—During this season northwest swell is more predominant than in spring because of the maestrale. Swells of 3 to 5 feet and higher occur as much as 65 percent of the time.

Autumn.—Northwesterly swells are still predominant as figure E shows, but have

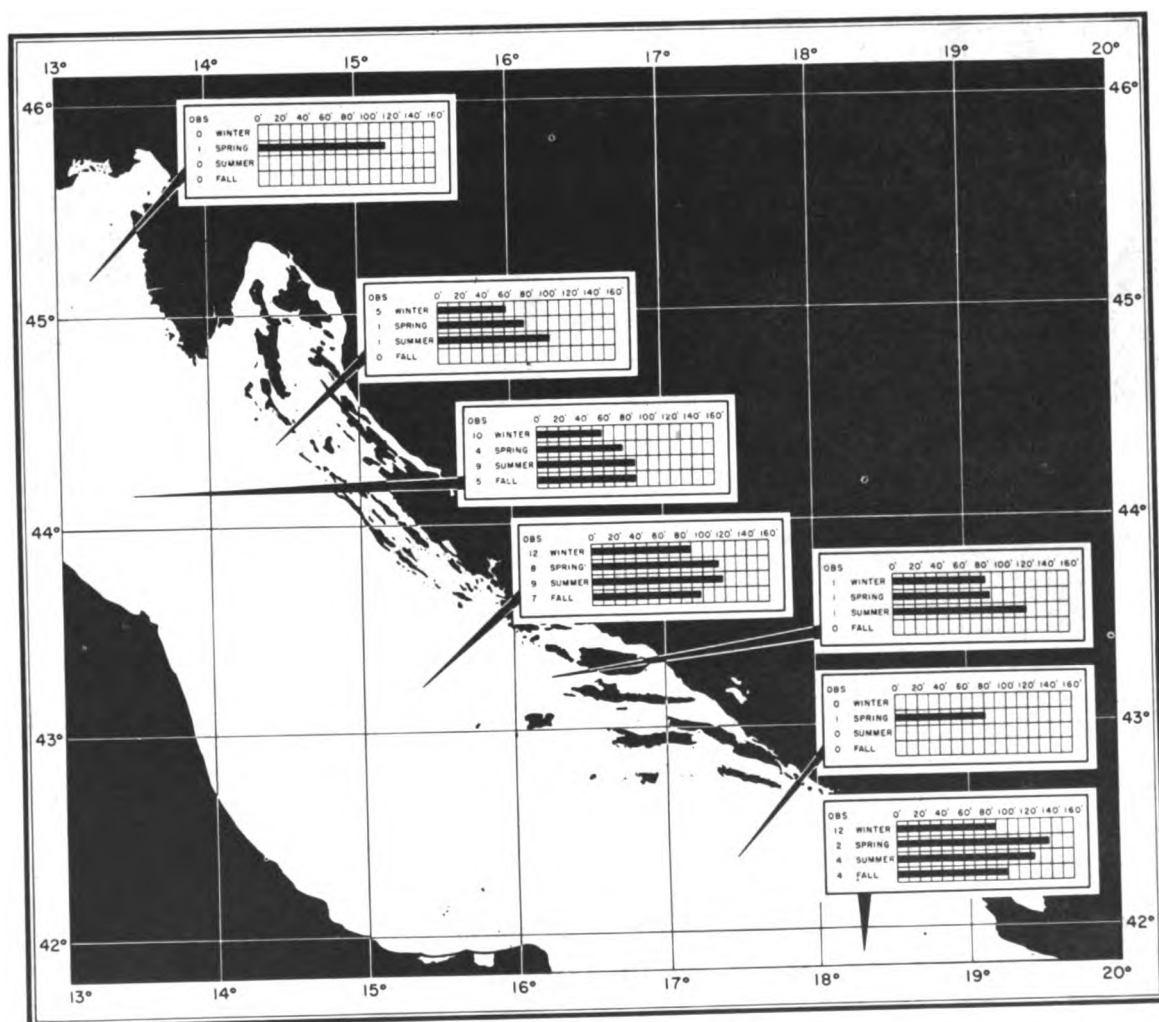


FIGURE D.—Water Color and Transparency

fallen off considerably from the high frequency of occurrence during summer. Otherwise there is little difference between these two seasons.

Winter.—This is the stormiest season in the Adriatic and the one with the roughest

seas. The bora is at maximum intensity and seas in excess of 8 feet occur frequently. Highest seas are from the northeast and north.

Surf.—Steep rocky cliffs rising sheer out of the sea are common along the Yugoslavian

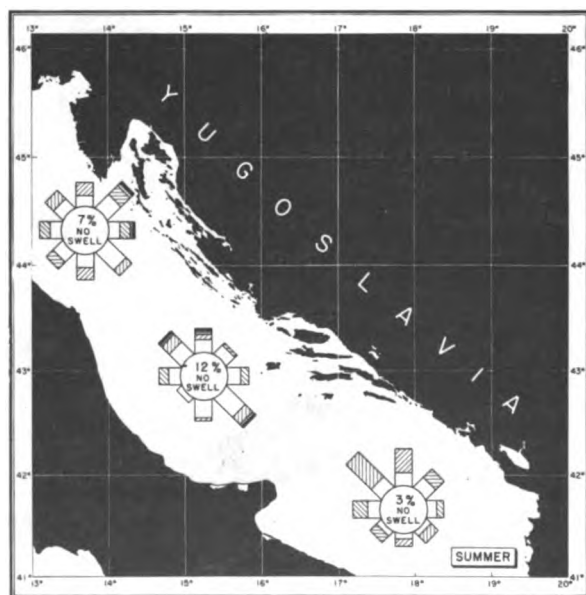
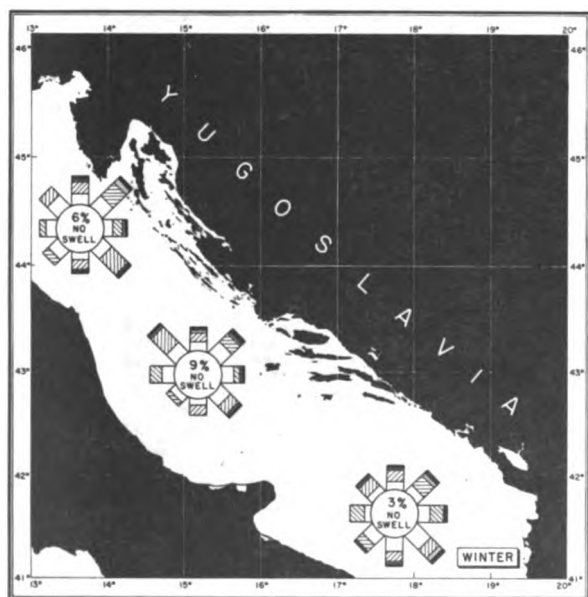
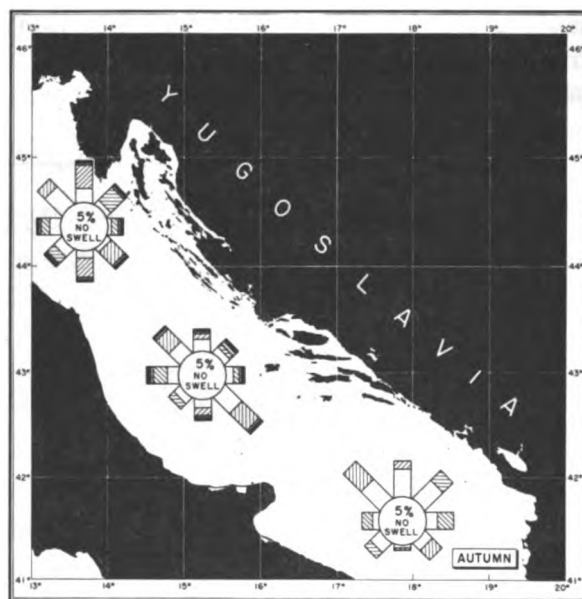
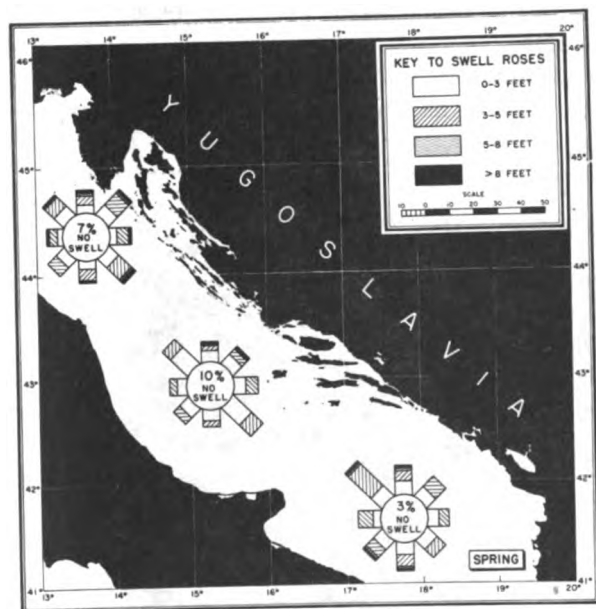


FIGURE E.—Swell

coast between the southern end of Istria and Split. Waves along this part of the coast crash directly against these cliffs so that there is no surf zone.

The beaches that do exist in this area are about equally divided between those moderate in slope and steep to abrupt in slope. Most of the former are located in the southern part of this area and are in general protected by offshore islands. Under extreme conditions of roughness from northwesterly seas, the beaches situated between $44^{\circ}10'$ N. and $44^{\circ}30'$ N. will experience wave heights of 8 feet, although refraction of the waves will tend to modify this height. A wave of 8 feet, the maximum probable height, would create a surf zone about 250 feet wide on a moderately sloping beach and a zone about 150 feet wide on a beach where the slope is steep. Southward of $44^{\circ}10'$ N. seas are fairly slight. Because of shallow water and the protection afforded by the off-lying islands, surf is slight.

Southward of Split there are only a small number of beaches. These are about evenly divided between beaches gentle to moderate in slope and those steep to abrupt in slope. Beaches between $42^{\circ}40'$ N. and $41^{\circ}55'$ N. are nearly all gentle to moderate in slope, and mostly protected. Under extreme conditions they would be subject to wave heights in excess of 8 feet which would create surf zones 260 feet wide or wider, particularly with seas from northwest. These latter will also cause considerable current along the shore.

ROUTES

GENERAL REMARKS

1-47 The route information in this publication covers the entire Mediterranean Sea as covered by H.O. Pubs. Nos. 52, 53, 54, 55, and 56, Sailing Directions for the Medi-

terranean, Volumes I through V. The Strait of Gibraltar, the entrance of the Mediterranean Sea, is the principal destination or departure for transoceanic or coastwise shipping. Ocean routings from or to the Strait of Gibraltar are not given in this volume, however, as a detailed description of them is summarized in the route section of H.O. Pub. No. 51, The West Coasts of Spain, Portugal, and North Africa and the Off-lying Islands.

In general the routes in the Mediterranean Sea are as direct as safe navigation permits. However, in certain instances a divergence is made from the direct track to take advantage of favorable currents, to obtain shelter by passing to the leeward of islands, and to minimize the effect of adverse currents. The additional mileage involved in the several deviations from the direct route duly compensate the navigator by saving time and fuel. It must not be inferred that recommendations in this section are the shortest distances between ports, nor do they necessarily represent adopted or established sea lanes.

Because of the great number of ports in the Mediterranean Sea, only the primary tracks are described. When navigating from or to ports in geographical proximity of these routes, vessels may join the primary tracks described herein as directly as safe navigation permits; otherwise proceed directly to destination by the shortest route. Where the same route may be followed either way the reverse route is not described. A route chart, contained in the envelope at the back of the book, outlines the primary routes in the Mediterranean Sea, and distances are shown for comparative purposes. For additional distances, see H. O. Pub. No. 151, Table of Distances Between Ports.

Caution.—The recommendations in this route section are based on normal unrestricted navigation, and no special deviations

to avoid mined danger areas are considered. Special routes through such danger areas are described in NEMEDRI, (Northern European and Mediterranean Routing Instructions), issued by the U. S. Navy Hydrographic Office.

PLAN

1-48 Routes are described progressively eastward from the Strait of Gibraltar, as follows:

1. Strait of Gibraltar to Oran, and to ports on the east coast of Spain, the south coast of France, and the west coast of Italy.
2. Strait of Gibraltar to ports on the North African coast, Malta, Libya, and Egypt.
3. Strait of Gibraltar to ports in the Adriatic Sea via Stretto di Messina or southward of Sicily.
4. Strait of Gibraltar to ports in the Aegean Sea and the Dardanelles.
5. Strait of Gibraltar to ports in south Turkey, Lebanon, and Israel.
6. Spanish and French ports to ports in the Aegean Sea and Port Said.
7. Ports in the Adriatic Sea to ports in the Aegean Sea via Dhiórix Korínthou or Dhiékpous Elafónisou—Stretto di Messina to ports in the Aegean Sea via Dhiórix Korínthou.
8. Port Said to ports in the Aegean Sea and the Dardanelles.

STRAIT OF GIBRALTAR TO ORAN, AND TO PORTS ON THE EAST COAST OF SPAIN, THE SOUTH COAST OF FRANCE, AND THE WEST COAST OF ITALY

1-49 To Oran, Algeria.—Vessels traversing the Strait of Gibraltar generally experience in the middle of the strait an east-going current, the rate of which is largely influenced by the direction of the wind. Inshore

of this east-going current the currents are tidal. See H. O. Chart 0285.

Vessels bound for Oran steer a course through the middle of the strait to a position about 5 miles northward of Punta Almina, Spanish Morocco, thence steer a direct course to a position 3 miles northward of Cap Falcon, passing about 2 miles southward of Isla del Alborán, and thence proceed to destination.

Oran to Strait of Gibraltar.—After clearing the harbor and reaching a position about $1\frac{1}{2}$ miles northward of Cap Falcon proceed direct to a position about $2\frac{1}{2}$ miles northward of Punta Almina, passing about 4 miles southward of Isla del Alborán, and thence along the coast to a position $1\frac{1}{2}$ miles northward of Punta Cires, being guided by the condition of the tidal currents. From the last position proceed to the junction point in the Strait of Gibraltar.

Strait of Gibraltar to Barcelona, Spain; Marseille, France; and Genova and Livorno, Italy.—After proceeding through the middle of the Strait of Gibraltar to a position $6\frac{1}{2}$ miles southward of Europa Point, steer a direct course to a position 10 miles southward of Cabo de Gata, taking advantage of the east-going current that sets from the strait, thence steer to a position 10 miles southeastward of Cabo de Palos, and thence steer to a position about $15\frac{1}{2}$ miles southeastward of Cabo de la Nao. From the latter position steer a course to the harbor of Barcelona.

Vessels bound for Marseille steer a direct course from the position off Cabo de Palos to a position 1 mile westward of Ile du Planier, and proceed to the harbor.

Vessels bound for Genova depart from the Barcelona track off Cabo de Palos and steer to a position about 3 miles northwestward of Isla Conejera and thence steer direct to destination.

Vessels bound for Livorno depart from the Genova track off Isla Conejera, thence steer to a position 10 miles northwestward of Isla Dragonera, and thence steer direct to destination, passing close southward of Isola di Gorgona.

When strong northwesterly winds are blowing, especially the mistral which is most frequent during the winter months, vessels bound for Marseille and Genova sometimes prefer to continue along the Spanish coast to Cabo San Sebastian, and thence steer to destination.

During the summer months some navigators bound for Genova or Livorno prefer to continue eastward from Cabo de Gata to a position 3 miles southward of Isla del Aire, passing southward of the Balearic Islands, and thence direct to destination; in the case of Livorno they join the above-mentioned route northward of Cap Corse, Corsica. Strong easterly currents have been reported along this route.

1-50 Barcelona to Strait of Gibraltar.—It has been reported that a southwesterly current sets closely along the east coast of Spain and continues westward along the south coast of Spain as far as Europa Point. West-bound vessels taking the following route will not only benefit by this current but will also avoid the adverse current that sets strongly through the Strait of Gibraltar.

After clearing the harbor of Barcelona steer southward to a position about 2 miles east-southeastward of Cabo de la Nao, thence direct to a position about 5 miles southeastward of Cabo de Palos, and thence steer southwestward to a position about 5 miles southward of Cabo de Gata. Follow the south coast of Spain at a distance of 3 to 5 miles offshore to a position about 9 miles southeastward of Málaga and then steer southwestward to a position about 2 miles southward of Europa Point. From Europa Point

steer to a position about $1\frac{1}{2}$ miles southward of Isla de Tarifa, taking care to avoid La Perla, and thence to the junction point of the Strait of Gibraltar. Vessels bound for English Channel ports depart from this track off Isla de Tarifa.

Marseille to Strait of Gibraltar.—Proceed to the westward of Ile du Planier, thence steer a direct course to a position 5 miles southeastward of Cabo de Palos and then proceed to destination as directed in the route from Barcelona.

Genova to Strait of Gibraltar.—Follow the reverse of the north-bound route northward of the Balearic Islands to a position 3 miles northwestward of Isla Conejera, thence steer to a position 5 miles southeastward of Cabo de Palos, and thence proceed to destination as directed in the route from Barcelona.

Livorno to Strait of Gibraltar.—Follow the reverse of the north-bound route northward of the Balearic Islands to a position 3 miles northwestward of Isla Conejera, and thence proceed as directed in the route from Genova.

Strait of Gibraltar to Napoli, Italy.—Vessels bound for Napoli proceed as directed previously to a position $6\frac{1}{2}$ miles southward of Europa Point, and thence continue eastward to a position 15 miles southward of Cabo de Gata. From the latter position steer a direct course to a position 7 miles south-southeastward of Capo Spartivento, Sardinia, and thence steer to Golfo di Napoli and destination.

Napoli to Strait of Gibraltar.—Follow the reverse of the east-bound route as far as the position southward of Capo Spartivento, wherefrom steer a direct course to a position 5 miles southward of Cabo de Gata, and continue to destination as directed in the route from Barcelona.

1-51 Strait of Gibraltar to Messina, Sicily.—Proceed as directed in the route to

Napoli to the position southward of Cabo de Gata, and thence steer to a position about 31 miles northward of Ile Galite. From the latter position steer a course to a position 5 miles northward of Capo San Vito, Sicily, and thence steer to a position 3 miles north-eastward of Capo Rasocolmo, passing about 3 miles southward of Isola Vulcano. Pass through the Stretto di Messina as directly as safe navigation permits and proceed to destination.

This route leads about $15\frac{1}{2}$ miles northward of the reported obstruction located north-northeastward of Ile Galite, and passes about 21 miles northward of Keith Reef. The current in the vicinity of Skerki Channel and Skerki Bank is variable in direction and strength. The current generally sets east-southeastward, and, during northwesterly winds, it has been observed to attain a rate of 3 to 4 knots. However, on occasions the current has been found to be setting between a northwesterly and north-northwesterly direction. Navigators must take great care when passing this area.

Navigating through the Stretto di Messina, although not difficult, requires utmost diligence as the tidal currents are very strong. For a detailed description of these currents, see H.O. Pub. 53.

Messina to Strait of Gibraltar.—West-bound vessels steer the reverse of the east-bound route to the position northward of Ile Galite, thence steer to a position 5 miles southward of Cabo de Gata, wherefrom follow the Spanish coast to destination as directed in the route from Barcelona.

STRAIT OF GIBRALTAR TO NORTH AFRICAN PORTS; VALLETTA, MALTA; TRIPOLI, LIBYA; AND ALEXANDRIA AND PORT SAID, EGYPT.

1-52 After passing through the middle of the strait to a position $6\frac{1}{2}$ miles south-

ward of Europa Point, steer a course to a position about $2\frac{1}{2}$ miles northward of Cap Bengut, passing about 8 miles northward of Cap Ténès and 3 miles northward of Cap Caxine. From Cap Bengut steer to a position $4\frac{1}{2}$ miles northward of Cap Serrat, passing about 3 miles northward of Cap Bougaroun thence round Ras Engela at a distance of 2 miles, pass between Iles Cani and Ras Zebib, and continue to a position about 2 miles northward of Cap Bon. Vessels bound for Valletta steer from the latter position to pass 2 miles northward of Punta Spadillo, Isola di Pantelleria, thence pass about 2 miles northward of the island of Gozo, and thence proceed to destination, taking care to avoid Secca il Baida (Bells Bank).

Vessels bound for Tripoli round Cap Bon at a distance of 2 to 3 miles and proceed direct to destination.

Vessels bound for Alexandria steer a great circle course from 2 miles northward of Punta Spadillo to destination. Vessels bound for Port Said steer a great circle course from Cap Bon to a position about 13 miles north-northeastward of Damietta Lighthouse, and thence proceed to destination as directly as safe navigation permits.

Port Said, Alexandria, Tripoli, and Valletta to Strait of Gibraltar.—West-bound vessels from Port Said proceed to a position about 13 miles north-northeastward of Damietta Lighthouse, and thence steer a great circle course to a position 3 miles northward of Iles Cani, taking care when passing southward of Graham Shoal and Pantelleria Bank. From this position steer a rhumb line course to a position 5 miles northward of Ile Galite, thence steer a direct course to a position 5 miles southward of Cabo de Gata, and thence onward along the Spanish coast to destination as directed in the route from Barcelona.

From Alexandria steer a great circle course to the position northward of Iles Cani,

and thence proceed as directed in the above-mentioned route.

From Tripoli steer the reverse of the east-bound route to a position off Cap Bon, thence to a position 3 miles northward of Iles Cani, and thence to destination as directed in the route from Port Said.

From Valletta steer in reverse of the east-bound route as far as Punta Spadillo, thence steer to a position 3 miles northward of Iles Cani, and continue westward as directed in the route from Port Said.

STRAIT OF GIBRALTAR TO VENEZIA, ITALY; TRIESTE, FREE TERRITORY OF TRIESTE; AND OTHER PORTS IN THE ADRIATIC SEA

1-53 Vessels bound for ports in the Adriatic Sea have the choice of two routes. The principal route through the Stretto di Messina is about 25 miles shorter than the route southward of Sicily. However, the current is favorably stronger along the North African coast and in the Strait of Sicily than along the route northward of Sicily and through the Stretto di Messina.

Via Stretto di Messina.—Follow the east-bound route to Messina as far as the Stretto di Messina. Pass through the Stretto di Messina as directly as prudent navigation permits, having due regard for the existing tidal currents, thence round Capo dell'Armi at a distance of about 2 miles, and steer to a position $2\frac{1}{2}$ miles southward of Capo Spartivento. From the latter position steer to a position about 4 miles southeastward of Capo Santa Maria di Leuca, and thence to a position about 2 miles eastward of Capo d'Otranto. Thence proceed northward about 12 miles, wherefrom steer a direct course to Venezia, giving the coast a berth of at least 5 miles as far as Brindisi.

Vessels bound to Trieste depart from the track leading to Venezia at a position about

4 miles west-southwestward of Ostrvo Jabuka, thence steer to a position about 6 miles west-southwestward of Rovinj, wherefrom proceed northward and, after rounding Punta Salvore at a distance of $1\frac{1}{2}$ miles, enter the Gulf of Trieste and proceed to destination.

Via southward of Sicily.—Follow the Port Said east-bound route as far as Cap Bon, and thence steer to a position about 3 miles southward of Capo delle Correnti. Thence steer to a position about 3 miles south-southeastward of Capo Passero, wherefrom steer to a position about 4 miles southeastward of Capo Santa Maria di Leuca. From the latter position proceed to destination as directed in the above-mentioned route.

Venezia, Trieste, and Adriatic Sea ports to Strait of Gibraltar.—Proceed in reverse of the in-bound route via Stretto di Messina, and thence proceed to destination as directed in the route from Messina.

STRAIT OF GIBRALTAR TO PIRAIÉVS AND THESSALONÍKI, GREECE; İZMİR, TURKEY; AND THE DARDANELLES

1-54 Follow the Adriatic Sea east-bound route southward of Sicily as far as the position southward of Capo delle Correnti. Thence steer to a position 1 mile southward of Akra Taínarón and pass through Dhiéklous Elafónisou to a position off Akra Maléa. From the latter position, if bound for Piraiévs, pass to the westward of Nísos Parapóla, thence steer $1\frac{1}{2}$ miles eastward of Akra Zóúrvá, and thence shape a course to the destination.

The currents in the vicinity of Nísos Parapóla are often strong and the set is uncertain; caution is necessary during thick weather.

Vessels bound for Thessaloníki, İzmir, and the Dardanelles proceed from off Akra Maléa through Porthmós Kéas and Porthmós Kafiréos to a position about 2 miles northwestward

of Akra Fássa. If bound for Thessaloníki, round Akra Kafirévs, thence pass close westward of Nízos Prasoùdha, taking care to avoid Nízos Gláros (at night, it is recommended to pass eastward of Nízos Prasoùdha), and thence steer for the entrance of Porthmós Skópelou between Nízos Skópelos and Nízos Skiáthos. After passing through Porthmós Skópelou, proceed northwestward into Thermaikós Kólpos to a position about 4 miles west-southwestward of Akra Epanomí. Thence proceed northward to the entrance of Kólpos Thessaloníkis and steer to destination as directly as safe navigation permits, giving due regard to the charted dangers.

Some navigators prefer to make passage through Nísoi Voríai Sporádhēs by using Porthmós Iliodhrómias, between Nízos Iliodhromia and Nízos Skópelos, as the distance several miles shorter, but the channel is narrow and the two islets located in it constitute a danger at night.

1-55 If bound for İzmir, vessels depart from the route to Thessaloníki at the position off Akra Fássa, and thence steer to pass about midway between Nízos Psará and Nízos Khíos to a position about 2 miles northwestward of Akra Mélaina. Thence steer northward of Nízos Khíos and the peninsula of Karaburun and enter İzmir Körfezi. Pass to the eastward of Uzun Ada and proceed to destination.

Vessels bound for İzmir sometimes proceed via Khios Strait. A course is steered from Akra Maléa to a position 2 miles southeastward of Nízos Sérifos, giving due regard to the strong and uncertain currents in the vicinity of Nízos Falkonéra. Thence steer to a position in Porthmós Mikónou between Nízos Míkonos and Nízos Tínos, wherefrom steer to a position about 2 miles southeastward of the Nízos Venétiko, off the southern extremity of Nízos Khíos. Enter Khios Strait by passing close westward of Ferner

Ada, thence pass through Egri-Liman Channel, on the eastern side of Nísoi Oinoúsai, and round the peninsula of Karagurun to the entrance of İzmir Körfezi. Proceed to destination as directed in the above-mentioned route.

There is no difference in distance between the latter two routes. The route via Khios Strait has the advantage of avoiding the strong adverse current encountered in Porthmós Kéas and Porthmós Kafiréos as well as having, during southerly winds, a favorable current in the strait. However, caution must be used when navigating in the vicinity of Nísoi Oinoúsai as the charted soundings in this area are not in sufficient detail.

Vessels bound for the Dardanelles continue northeastward from the position northwestward of Akra Fássa to a position about 4 miles west-northwestward of Presa Adalari, wherefrom a course is laid to the entrance of the Dardanelles. The outflow of water from the Dardanelles forms strong currents setting to the westward and southwestward in the approaches of the Dardanelles. Great care must be taken when navigating in this vicinity.

Piraiévs, Thessaloníki, İzmir, and the Dardanelles to the Strait of Gibraltar.—Proceed in reverse of the east-bound route (in the case of İzmir northward of Nízos Khíos) to a position southward of Akra Taínaron. Thence steer to a position about 6½ miles south-southwestward of Capo delle Correnti, where the westbound track from Port Said is joined, and continue westward as directed in the route from Port Said.

STRAIT OF GIBRALTAR TO ISKENDERUN, TURKEY; BEIRÛT, LEBANON; AND YÁFÔ (JAFFA) AND TÊL AVÎV, ISRAEL

1-56 Vessels bound to any of these ports have a common track as far as 3 miles south-

ward of Capo delle Correnti as directed in the east-bound track southward of Sicily to ports in the Adriatic Sea.

If bound for Iskenderun, proceed from the position off Capo delle Correnti to 3 miles southward of Nisos Avgó in Dhiéklpous Kíthiron. Continue eastward to a position $2\frac{1}{2}$ miles northward of Nisos Saría, passing between Nisos Karavonísia and Nisos Avgó in the eastern part of Kritikón Pélagos. Steer through Stenón Karpáthou to a position 5 miles south-southwestward of Prasonísi, Nisos Ródhos, thence proceed eastward to pass a position 5 miles southward of Anamur Burnu, and thence continue eastward to Iskenderen Körfezi and destination.

From Iskenderun to the Strait of Gibraltar, proceed in reverse of the east-bound route to a position southward of Nisos Avgó, thence steer to a position about $6\frac{1}{2}$ miles south-southwestward of Capo delle Correnti, where the west-bound track from Port Said to the Strait of Gibraltar is joined. Thence continue to destination as directed in the route from Port Said.

Vessels bound for Beirūt from the Strait of Gibraltar steer from the position of 3 miles southward of Capo delle Correnti to a position 2 miles northward of Akra Spátha, Crete, and thence steer eastward to a position $2\frac{1}{2}$ miles northward of Nisos Paximádhá. From the latter position steer a direct course to the approaches of Beirūt, passing through Kaso Strait and about $2\frac{1}{2}$ miles southward of Nisos Kásos.

From Beirūt proceed in reverse of the east-bound route to a position northward of Akra Spátha, thence steer to a position about $6\frac{1}{2}$ miles south-southwestward of Capo delle Correnti, and proceed to destination as directed in the route from Iskenderun.

To Yáfō and Tēl Avīṽ from the Strait of Gibraltar: Steer a direct rhumb line course from the position southward of Capo delle

Correnti to destination; passing southward of Nisos Gávdhos.

From Yáfō and Tēl Avīṽ to the Strait of Gibraltar: Steer a rhumb line course to a position about $6\frac{1}{2}$ miles south-southwestward of Capo delle Correnti, wherefrom proceed to destination as directed in the West-bound route from Iskenderun.

BARCELONA AND MARSEILLE TO PORTS IN THE AEGEAN SEA AND PORT SAID

1-57 The route from Barcelona passes southward of Sicily and the route from Marseille passes through the Stretto di Messina.

From Barcelona to Port Said and Aegean Sea: After clearing the harbor, steer a direct course to pass 4 miles southward of Isla Toro, off the southern coast of Sardinia, and thence proceed to a position about 7 miles south-southeastward of Capo Spartivento. From the latter position steer to pass northward of Keith Reef and Sylvia Knoll to a position 9 miles south-southwestward of Capo Granitola, having due regard for the currents in the Strait of Sicily. Follow the southern coast of Sicily to a position $9\frac{1}{2}$ miles south-southwestward of Capo delle Correnti, and thence steer a great circle course to a position 13 miles north-northeastward of Damietta Lighthouse. Thence proceed to destination. If bound for ports in the Aegean Sea, follow the southern coast of Sicily to a position 3 miles southward of Capo delle Correnti and continue eastward as directed in the track given from the Strait of Gibraltar to Aegean Sea ports.

To Barcelona from Port Said and Aegean Sea ports: Proceed as directed on the west-bound tracks from the respective ports to a position southward of Capo delle Correnti, thence proceed direct to a position 9 miles south-southwestward of Capo Granitola, and

continue to destination in reverse of the directions in the east-bound route.

From Marseille to ports in the Aegean Sea and Port Said: This route passes through the Strait of Bonifacio. After leaving the approaches of the harbor, proceed between *île du Planier* and *île Maire* to a position about 2 miles westward of *île Riou*, wherefrom steer to a position about 3 miles southward of *Les Moines*, off the southern coast of Corsica. Steer as directly as safe navigation permits through the Strait of Bonifacio via *Bocca Grande* channel to a position $1\frac{1}{2}$ miles northeastward of *Isla La Presa*. Then proceed directly to the *Stretto di Messina*, passing between *Isola Panaria* and *Isola Salina*. Utmost caution must be taken to avoid *Secca del Capo* (a $4\frac{1}{2}$ -fathom shoal) in approaching *Isola Panaria*. Pass through the *Stretto di Messina*, having due regard for the strong tidal currents, to a position 3 miles southward of *Capo dell'Armi*. From the latter position, if bound for ports in the Aegean Sea, steer directly to a position 1 mile southward of *Ákra Taínaron*, and proceed to respective destinations as directed in the eastbound route from the Strait of Gibraltar.

If bound for Port Said, depart from the above-mentioned track off *Capo dell'Armi* and steer a rhumb line course to a position 13 miles north-northeastward of *Damietta Lighthouse*, passing southward of *Nísos Gávdhos*, and thence to destination.

PORTS IN THE ADRIATIC SEA TO PORTS IN THE AEGEAN SEA VIA DHIÓRIX KORÍNTHOU OR DHIÉKPLOUS ELAFÓNISOU — STRETTO DI MESSINA TO PORTS IN THE AEGEAN SEA VIA DHIÓRIX KORÍNTHOU

1-58 Vessels that are able to transit *Dhiórix Korínthou* (Corinth Canal) will save a substantial distance by navigating

the canal route from ports in the Adriatic Sea, or *Stretto di Messina* and ports northward and westward, to ports in the Aegean Sea and Black Sea.

From Adriatic Sea through Dhiórix Korínthou: After passing the Strait of Otranto to a position off *Capo d'Otranto*, continue southward to a position about $1\frac{1}{2}$ miles southwestward of *Ákra Doukáton*, *Nísos Levkás*. Pass between *Nísos Levkás* and *Nísos Kefallinía*, thence northward and eastward of *Nísos Itháki* to a position $1\frac{1}{2}$ miles southwestward of *Nísos Oxía*, and thence proceed through *Patraikós Kólpos* and *Korinthiakós Kólpos* and enter *Órmos Korínthou*. After making the canal transit, vessels bound for *Piraiévs* pass close southward of *Nísos Salamís*, taking care to avoid the reported shoal water off *Ákra Kókhi*, and thence to destination.

Vessels bound for *Thessaloníki Izmir*, and the *Dardanelles* pass between *Nísos Salamís* and *Nisídhēs Eleoúsai* and enter *Saronikós Kólpos*. Thence steer southeastward to the southern approaches of *Porthmós Kéas*, passing southward of *Nísos Fléves* and *Nisís Patróklou*, and join the eastbound track from the Strait of Gibraltar to respective destination.

From Adriatic Sea to Aegean Sea ports via Dhiékploús Elafónisou: Proceed south-southeastward from the position off *Capo d'Otranto* to a position $6\frac{1}{2}$ miles west-southwestward of *Ákra Yerogombós*, *Nísos Kefallinía*. Thence continue south-southeastward to a position 5 miles southwestward of *Nísos Sapiéntza*, passing eastward of *Nisídhēs Strofádhēs*, and thence steer to a position about 1 mile southward of *Ákra Taínaron*. From the latter position proceed to respective destination as directed in the eastbound route from the Strait of Gibraltar.

When approaching *Ákra Taínaron* care must be taken not to come too close to *Nísos Karávi*.

From the Stretto di Messina to Aegean Sea via Dhiórix Korínthou: Upon arriving at a position $2\frac{1}{2}$ miles southward of Capo Spartivento, steer to a position about 2 miles northward of Ákra Skinári, Nísos Zákynthos. Thence proceed northeastward to a position about $1\frac{1}{2}$ miles northward of Ákra Pápas, where the canal route from the Adriatic Sea ports is joined. Continue to respective destination as directed in the route from the Adriatic Sea ports. Kakava Shoal, off the southeastern extremity of Nísos Kefallínia, should be given a wide berth when rounding Ákra Mounda.

Via Dhiéklous Elafónisou: From a position 3 miles southward of Capo dell'Armi, steer a course to a position 1 mile southward of Ákra Tainaron, and proceed to destination as directed in the east-bound route from the Strait of Gibraltar.

PORT SAID TO PORTS IN THE AEGEAN SEA AND THE DARDANELLES

1-59 To Piraiévs: After arriving at a position 13 miles north-northeastward of Damietta Lighthouse, steer to a position about 7 miles northeastward of Ákra Sídheros, Crete, via Kaso Strait, thence continue northwestward between Nísos Khristiná and Nísos Folégandros. From the latter position pass about 2 miles eastward of Nísos Políaiagos and steer to a position 2 miles westward of Nísos Fléves, passing southwestward of Nísos Sérifos and Nísos Kíthnos and northward of Nísos Áyios Yéoryios, and thence steer to destination.

Navigators are advised to give due consideration to the strong southerly and southwesterly set in the vicinity of Porthmós Serífou, Porthmós Kíthnou, and Porthmós Kéas.

To Thessaloníki and the Dardanelles: This route passes through Stenón Karpáthou. From a position 13 miles north-northeastward of Damietta Lighthouse, steer a rhumb line course to a position 3 miles east-northeastward of Nísoi Liádhoi, passing about $11\frac{1}{2}$ miles southwestward of Prasonisí and about 8 miles southwestward of Nísos Antileoúsa. Vessels bound for the Dardanelles steer to pass 3 miles west-southwestward of Ákra Papás, Nísos Ikaría, 3 miles eastward of Nísos Psará, 4 miles westward of Nísos Sígri, and thence to a position 3 miles westward of Bozca Ada. Thence proceed northward, and, taking care to avoid the foul ground in the vicinity of Bozca Ada and Presa Adalari, enter the Dardanelles as directly as safe navigation permits.

Vessels bound for Thessaloníki depart from the Port Said—Dardanelles route 3 miles east-northeastward of Nísoi Liádhoi and steer to a position close westward of Nísos Prasoúdhá. Thence proceed to destination as directed in the east-bound route from the Strait of Gibraltar.

The latter route passes within a few miles of the islets of Melántioi and Nísos Khtapodhía, which have no lights on them. When navigating in this vicinity at night utmost caution must be taken.

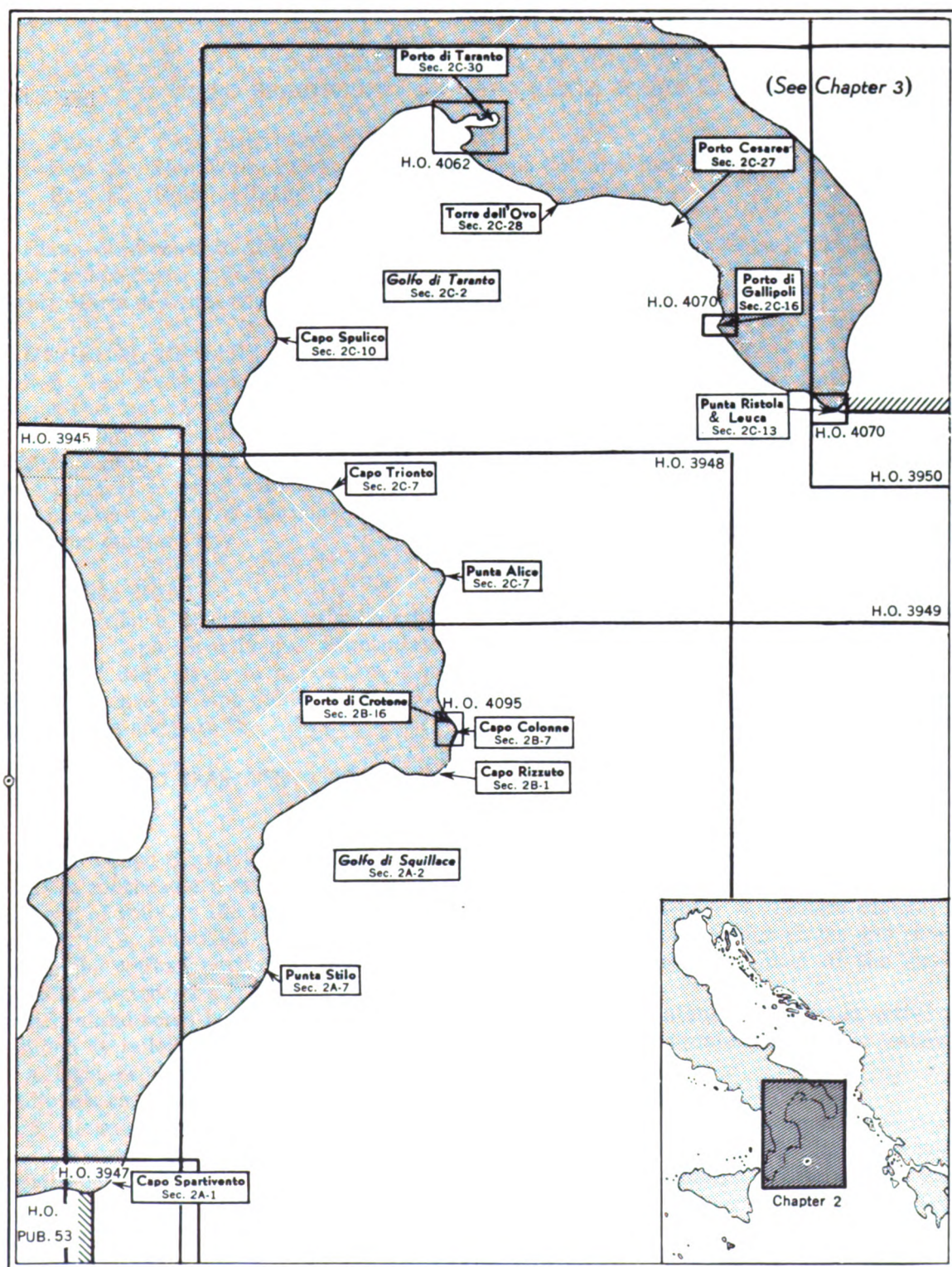


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office
 Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 2—GRAPHIC INDEX

CHAPTER 2

SOUTHEASTERN COAST OF ITALY FROM CAPO SPARTIVENTO TO CAPO SANTA MARIA DI LEUCA

Part A. Capo Spartivento to Capo Rizzuto.

Part B. Headland of Capo Rizzuto and Capo Colonne, including Porto di Crotone.

Part C. Golfo di Taranto, including Porto di Taranto.

Plan.—The coast in this chapter is described in sequence from Capo Spartivento north-eastward to Porto di Taranto, including the western coast of Golfo di Taranto, and from Capo Santa Maria di Leuca northwestward to Porto di Taranto.

GENERAL REMARKS

2-1 The coast described in this chapter forms the foot of the so-called boot of Italy and consists of Golfo di Taranto, to north-eastward, and a lesser bight known as Golfo di Squillace, to southwestward. The outer southeastern shores of this coast are without off-lying dangers.

NAVIGATION

2-2 From a position 2 miles southeastward of Capo Spartivento Lighthouse, a course of 045° leads to a position 4 miles southeastward of Capo Santa Maria di Leuca Lighthouse and into the Adriatic.

PART A. CAPO SPARTIVENTO TO CAPO RIZZUTO

2A-1 Capo Spartivento (37°55' N., 16°04' E.), the southeastern extremity of the southern end of Italy, is 158 feet high, rugged and rocky; it is identified from a distance as being the whitest portion of the coast. The cape is fronted by a narrow sandy beach on which stand some houses. No dangers exist beyond 1½ mile offshore.

A light is shown on Capo Spartivento; a radiobeacon transmits from the lighthouse.

A disused signal station stands close northwestward of the lighthouse on Capo Spartivento.

COAST—GENERAL

2A-2 Between Capo Spartivento and Punta Stilo, a low point 40 miles northeastward, the coast recedes slightly and consists of a low narrow sandy beach backed by hills; farther inland this coast is backed by moderately high mountains. There are numerous river mouths, villages, and towers along this stretch of coast. The coastal villages and some of the villages on the interior hills are conspicuous. A railroad follows the coast close to the shore.

Between Punta Stilo and Capo Rizzuto, about 36 miles northeastward, the coast recedes uniformly about 14 miles forming Golfo di Squillace. The shores, which are low and sandy, are backed at varying distances by the high green Appennino Calabrese. The extreme northern shore of the gulf is formed by a rocky headland terminating in Capo Rizzuto and Capo Colonne and is described in part B. Several villages line the coast, and numerous rivers and streams empty into the gulf. Most of the streams are torrential.

Marina di Catanzaro, the most active port in the gulf, is situated 22½ miles northward of Punta Stilo.

DANGERS

2A-3 The shore between Capo Spartivento and Punta Stilo for the most part is fringed with shoals, but none extend beyond about ½ mile offshore. Golfo di Squillace is

deep and free of dangers. At no position in the gulf does the 6-fathom curve lie farther than 1 mile offshore, and at many places it approaches as close as 300 yards. Reefs in the vicinity of Capo Rizzuto are described in part B.

NAVIGATION

2A-4 Along the coast.—From a position 2 miles southeastward of Capo Spartivento a course of 041° for 76 miles leads clear of danger to a position 3 miles southeastward of Capo Rizzuto. The nearest this course approaches land is 3 miles off a position close southwestward of Punta Stilo.

To the Adriatic.—See section 2-2.

CURRENT AND WIND

2A-5 Current.—A weak current usually sets to the southwest along the coast, its strength being increased by northeasterly winds. In Golfo di Squillace the current is variable and is influenced by the wind. Ordinarily it follows the coast, sometimes attaining a velocity of 2 knots.

Wind.—Strong northeasterly and southeasterly winds frequently accompanied by rain prevail in winter. Southeasterly winds, locally called *barrata*, are preceded by dark clouds to southeastward. Clouds on the mountains usually presage northeasterly winds.

Winds nearly always blow in the gulf but are influenced by the land formation and are seldom steady in direction. During the season of the year when calms are experienced in the offing, an offshore breeze will usually be encountered in the gulf.

The southeasterly wind (*Sirocco*) usually brings rain, squalls, and haze which hides the coast from view. The thickening of clouds over Capo Spartivento and on Monte Scapparone precede foul weather to seaward. During winter, refraction phenomena occur.

LANDMARKS—COASTAL FEATURES

2A-6 Capo Bruzzano, 7¾ miles north-northeastward of Capo Spartivento, is a

slightly projecting whitish and steep rocky point. Monte Scapparone, 3,465 feet high and about 6 miles westward of Capo Bruzzano, has a conspicuous sparsely wooded rounded summit.

About midway between Capo Spartivento and Capo Bruzzano is situated **Brancaleone Marina**, consisting of a few houses and a campanile. A three-arch masonry bridge crosses a stream close northeastward of the village. The village of Brancaleone, dominated by a large church, stands on a hill 1¼ miles northwestward of the Marina. A dangerous wreck lies close northeastward of the village.

The large village of **Bianco**, situated about 3 miles northward of Capo Bruzzano, is surrounded northward and southward by light-colored hills. A sandbank lies about 1½ miles northeastward of Bianco and close off the coast; the bank is probably caused by silt from nearby streams and presents a danger to navigation. **Anchorage** may be had about ¼ mile offshore in front of the village in about 10 fathoms, sand. This anchorage is dangerous with southeasterly winds as they cause heavy seas and haze. A bridge crosses the mouth of each of two rivers about 2¼ and 2¾ miles, respectively, northward of Bianco. The northern bridge is the larger and more conspicuous of the two.

2A-7 Coast—Between Capo Bruzzano and Punta Stilo, 32½ miles northeastward, the coast contains a number of marinas and river mouths which are crossed near their mouths by bridges. Numerous villages in the hills backing the shore are visible. **Bov-alino Marina**, 3½ miles north-northeastward of Bianco, has a conspicuous railroad station and a steeple, topped by four small spires, in the center of town. A large castle stands about 1½ miles northwestward of the town and is conspicuous from northeastward. **Anchorage** can be had in the depth desired off the village.

Monte delle Tre Dita, a conspicuous mountain 2,461 feet high and consisting of three truncated conical peaks, is located about midway between Capo Spartivento and Punta Stilo and about 5 miles inland. Only two

peaks are visible usually, except on bearings less than 340° .

Adore Marina, about 2 miles northeastward of Bovalino Marina, is of little importance; a conspicuous church with a white steeple is in the center of town.

Locri, about $4\frac{1}{2}$ miles northeastward of Adore Marina, is a modern town which can be seen along the coast. There are several conspicuous steeples in town and two large yellow buildings southward of the town. One of the buildings has a tall chimney and the other has a red roof.

Siderno Marina, about $2\frac{1}{2}$ miles farther northeastward, is dominated by the quadrangular yellow steeple of a church. There is anchorage about 550 yards offshore in about 10 fathoms; it is sheltered from westerly and northwesterly winds but dangerous with the more frequent easterly or southeasterly winds. There is a small pier; ships use their own gear. Provisions and water are available in small quantities.

Marina di Gioiosa Ionica, a small town about $2\frac{1}{2}$ miles northeastward of Siderno Marina, is located near the mouth of Fiumara Turbido, which is spanned by a bridge supported on five piers. The waters in front of the town are very deep and not suitable for anchorage. Provisions, water, and fuel oil are available in limited quantities.

Roccella Ionica, about $3\frac{1}{2}$ miles east-northeastward of Marina di Gioiosa Ionica, is an export center for olive oil, charcoal, lumber, cattle, and cotton and silk cocoons. The town is dominated by a rocky cliff surmounted by a large citadel; close northward of the citadel is a large tower. Vessels coming from seaward or running coastwise find the citadel with its big quadrangular castle an excellent landmark. From northeastward or southwestward, the citadel and tower appear like two great castles. Anchorage is available with good holding ground; in winter, any anchorage in this area may be dangerous because of bad weather. Two wrecks lie in front of the town. Provisions and water are available in small quantities. There are telegraph and telephone facilities.

The coast between Roccella Ionica and Monasterace, about 11 miles northeastward, has several conspicuous towers and small villages of minor importance.

Monasterace is built on a semiconical hill which is surrounded by a wall and gives the appearance of a large castle from the distance.

In **Golfo di Squillace** (sec. 2A-2), there is almost always wind in any season of the year, even when there is a calm outside.

Punta Stilo ($38^{\circ}27' N.$, $16^{\circ}35' E.$) is low and sandy and is overlooked by a hill on which stands the lighthouse. Monte Consolino, 2,300 feet high, lies 6 miles inland in range with the lighthouse and Monasterace. Its rugged vertical cliff is conspicuous. The sharp peak of Monte Stella, 3,432 feet high and about 2 miles southwestward of Monte Consolino, is readily identified from northeastward.

Punta Stilo Light is shown from an octagonal black and white horizontally banded tower, 44 feet high, on a hill at Punta Stilo. There is a yellow house at its base.

Badolato Stazione, $7\frac{1}{2}$ miles northward of Punta Stilo, affords the best anchorage off this part of the coast in 32 feet about 850 yards off the beach in front of the village. The westerly wind is dangerous as it has a whirling characteristic. A wreck, partially submerged and dangerous, lies about $1\frac{1}{2}$ miles off the beach and about $1\frac{1}{2}$ miles southeastward of the anchorage. The village is not easily seen from seaward. Southward of the village are two dark isolated houses on top of two hills; these houses are the best landmarks in this vicinity. Badolato, about 2 miles westward of Badolato Stazione, can be seen only in the early morning hours, the most conspicuous object being the church on top of a hill.

Soverato Marina, 7 miles northward of Badolato Stazione, is conspicuous from seaward. A gray church with a red roof stands on a hill dominating the town; next to the church is a large brick-colored two-story building. A wreck is located about $3\frac{1}{4}$ miles southeastward of the town in a position about $1\frac{1}{2}$ miles off the beach.

Anchorage, one of the safest on the Ionian coast, is available in 16 fathoms, sand, about 200 yards offshore with the above church bearing about 230°. The anchorage is partially protected by a sandspit which extends about 330 yards from the coast. The coast in this area is becoming shallower because of silt from a nearby river. A mooring buoy, for the use of fishing craft, is located in the roadstead. Fresh provisions and water are available; small quantities of fuel oil are also available. Telegraph and telephone facilities and several private clinics are in the port.

Punta di Staletti (38°45' N., 16°34' E.), 19 miles northward of Punta Stilo, is the extremity of a rocky steep-sided promontory partially covered with vegetation. A red-roofed castle with crenellated turret stands on its summit. Near the point is a conspicuous viaduct with 12 arches.

The village of **Squillace**, about 3 miles northwestward of Punta di Staletti, stands on a conspicuous isolated conical hill, 1,132 feet high, which is covered with dark vegetation. A prominent castle overlooks the village.

2A-8 Marina di Catanzaro, a sprawling town about 4½ miles northeastward of Punta di Staletti, is the most commercially active town in the gulf. Conspicuous are numerous chimneys, various tall white factories, the long steel railway bridge to southward of the town, and a quadrangular ruined tower standing on an isolated hill northwestward of the town, all appearing prominently in contrast against the wooded background.

The port exports tannic acid, lumber, oil, soap, and building materials; it imports flour and cement. Vessels work their cargo in the roadstead; there are a number of lighters of about 15 tons capacity. Fresh provisions and water are available in moderate quantities, coal and fuel oil in limited quantities. Telegraph, telephone, and medical facilities are in the port.

Marina di Catanzaro Light is shown from a building with the lower part painted in black and white checkers and the upper part

in black and white bands, the whole 30 feet high, situated on the beach in front of the town. The light structure is inconspicuous.

Red flashing lights are shown from a pylon about 5 1/2 miles northeastward of the latter light, and 1 1/2 miles inland.

Navigation.—From a position 3.5 miles southeastward of Punta Stilo Lighthouse a course of 000° for 25 miles leads to Marina di Catanzaro. From the marina a course of 084° for a similar distance rejoins the coastal track in a position 3 miles southeastward of Capo Rizzuto.

Anchorage.—In winter with fresh offshore winds vessels anchor usually close inshore where depths are great and holding ground good. With steady northerly winds vessels customarily use a stern anchor well offshore in 11 to 14 fathoms paying out chain shoreward to the desired depth and then run a hawser to shore to maintain position. A recommended anchorage lies in a depth of 19 fathoms about 300 yards off the light structure on the range of the light structure with a bright red two-storied house with a flat roof on a hill northwestward of it bearing 320°.

Pilots.—Local authorized pilots are available.

Catanzaro, a large town, is situated 5 miles northward of the marina. It is easily identified as a large white patch against the mountains, and at night its lights are visible from 15 miles seaward.

2A-9 Coast.—Between Marina di Catanzaro and Capo Rizzuto, 23 miles east-northeastward, the shore consists of a low flat beach about 1 mile wide. Torre del Crocchio, conspicuous though in ruins and of dark aspect, rises on the western bank of a river 11½ miles east-northeastward of Marina di Catanzaro. About 2/3 mile northwestward of the tower are several houses, the most conspicuous being the yellow railway station of Cropani. The houses of Botricello are visible on a slight rise of ground about 2½ miles north-northwestward of the tower. Marina di Botricello lies on the wooded shore and consists of low dwellings, the campanile and railway station being conspicuous.

Tempone Tenese, a hill 650 feet high, of dark color with yellow patches, rises about 4 miles northeastward of Torre del Crocchio. Torre di Magliacane, a gray cylindrical tower, stands about $\frac{3}{4}$ mile south-southwestward of the hill's summit. Tempone Steccato, about 328 feet high, is another hill situated about 2 miles eastward of Torre Magliacane and has several houses standing southward of its summit.

Barco Vercillo, a cove about 7 miles eastward of Torre del Crocchio, provides anchorage in 7 fathoms, sand, about 600 yards offshore. A sandy shoal lies in the eastern part of the anchorage.

ANCHORAGES.

2A-10 Anchorage may be taken anywhere along this coast where the depth permits, but no protection is afforded from offshore winds. Positions of recommended anchorages follow:

Bovalino Marina.—See section 2A-6.
 Siderno Marina.—See section 2A-7.
 Roccella Ionica.—See section 2A-7.
 Badolato Stazione.—See section 2A-7.
 Soverato Marina.—See section 2A-7.
 Marina di Catanzara.—See section 2A-8.
 Barco Vercillo.—See section 2A-9.

PART B. HEADLAND OF CAPO RIZZUTO AND CAPO COLONNE

2B-1 Capo Rizzuto ($38^{\circ}53' N.$, $17^{\circ}06' E.$), 36 miles northeastward of Punta Stilo, is the extremity of a low rocky steep-sided promontory that projects nearly 1 mile southward from the headland. Besides the lighthouse there are two conspicuous towers; the one to eastward is cylindrical and that to westward is square. The small village of Madonna Greca lies about 1 mile north-northeastward of the cape. The large town of Catanzaro (sec. 2A-8) is visible from off the cape as a large white patch against the mountains.

Capo Rizzuto Light is shown from an octagonal tower, 57 feet high, standing seaward of a one-story building, both painted white, situated about 400 yards north-northwestward of the extremity of the cape.

COAST—GENERAL

2B-2 This rocky headland, 76 miles northeastward of Capo Spartivento, has a perimeter of about 20 miles from Le Castella to Porto di Crotonne. Capo Rizzuto forms its southwestern extremity and Capo Colonne its northeastern.

DANGERS

2B-3 No dangers lie farther offshore than $1\frac{1}{4}$ miles.

NAVIGATION

2B-4 A course of 041° from a position 3 miles southeastward of Capo Rizzuto Lighthouse clears the headland at a minimum distance of 2.5 miles and seaward of all dangers, passing 4.2 miles southeastward of Capo Colonne Lighthouse.

LANDMARKS—COASTAL FEATURES

2B-5 Southern side of headland.—Le Castella, a conspicuous group of ruined bastions surmounted by a cylindrical tower, stands almost surrounded by the sea on a low peninsula, 3 miles westward of Capo Rizzuto. The peninsula forms the eastern entrance point of Barco Vercillo (sec. 2A-10), a small cove, and the western entrance point of a bay receding about 1 mile northward between it and Capo Rizzuto. The shore of the latter bay is steep and moderately high. From its northeastern part Capo Piccolo projects southward a short distance. Overlooking the bay northward about $\frac{1}{2}$ mile is a barren eminence, 410 feet high, on which stands Torre Ritani which appears as a red-roofed house surrounded by a wall. Two whitish silos, about 1 mile northeastward of the tower, are conspicuous from eastward and southward. A wreck lies about $\frac{1}{4}$ mile eastward of the southern extremity of the low peninsula which contains Le Castella.

Secca Le Castella, about $\frac{1}{2}$ mile south-southwestward of Le Castella, are two rocky heads lying close together and having a least depth of 11 feet. A least depth of 20 feet exists in the channel between the reefs and the shore. The two towers on Capo Rizzuto in range lead safely southward of the danger.

A shoal with a least depth of 12 feet extends $\frac{1}{2}$ mile northwestward from the square tower on Capo Rizzuto. Two isolated rocky heads with depths of 12 and 18 feet lie, respectively, 1.6 miles west-northwest-

ward and 0.6 mile northwestward of Capo Rizzuto Lighthouse.

Anchorage.—There is an anchorage over a rocky and irregular bottom in the bay between Le Castella and Capo Rizzuto. A vessel should approach Capo Piccolo on a bearing of 011° and anchor in depths of 8 to 11 fathoms on a line between Le Castella and the cylindrical tower on Capo Rizzuto.

2B-6 Eastern side of headland.—**Secche di Capo Rizzuto (Secche di Madonna Greca)** consists of two shoals located $1\frac{1}{2}$ and 2 miles, respectively, east-northeastward of Capo Rizzuto. The former has a depth of 12 feet and lies about 0.8 mile offshore, and the latter has a depth of 26 feet and lies 1.2 miles offshore. Another shoal with depths of 9 feet extends nearly $\frac{1}{2}$ mile offshore from a position 1 mile northwestward of Capo Rizzuto. Capo Colonne bearing about 022° and just open on Capo Cimiti leads safely clear southeastward of these dangers. They lie, however, in an obscured sector of Capo Colonne Light but are covered by the red sector of Capo Rizzuto lower light.

A stranded wreck lies about $2\frac{1}{5}$ miles east-northeastward of Capo Rizzuto.

The coast from Capo Rizzuto to Capo Colonne, about 10 miles northeastward, is generally flat and rocky with many cliffy points from 50 to 65 feet high. Le Arene Rosse are two reddish bluffs situated on the coast about $3\frac{1}{4}$ miles northeastward of Capo Rizzuto.

Capo Cimiti is the extremity of a low rocky promontory located about midway between Capo Rizzuto and Capo Colonne. About $1\frac{1}{2}$ miles west-southwestward of the lighthouse on Capo Colonne there is a prominent white viaduct with numerous arches.

2B-7 Capo Colonne ($39^\circ 02' N.$, $17^\circ 12' E.$) is the northern extremity of a flat promontory about 65 feet high which has a horizontal contour similar to an axe head. Punta Cicula forms the southern extremity of the promontory about $\frac{2}{3}$ mile southward. Conspicuous on the cape are some houses, the

lighthouse, a large quadrangular tower, and a chapel. Close seaward of the lighthouse are the ruins of an ancient temple and a large column. From the vicinity of the cape may be seen Monte San Nicola dell'Alto and Castello di Strongoli (sec. 2C-6). A shoal with a depth of less than 6 feet extends 400 yards eastward from the cape.

Capo Colonne Light is shown from an octagonal tower, 72 feet high, on a two-story quadrangular building, the whole painted white, situated about 450 yards south-southwestward of the northern extremity of Capo Colonne.

A radiobeacon transmits at Capo Colonne Light.

A disused signal station, consisting of a building surmounted by a tower, painted in black and white checkers, stands at an elevation of about 472 feet about 2 miles westward of the lighthouse. Storm signals are displayed (sec. 1-11).

Gunnery exercises are sometimes held against shore targets between Capo Cimiti and Capo Colonne. Fishing and navigation within the area at such times are prohibited.

Anchorage.—Vessels can anchor southward of Capo Colonne in about 11 fathoms with Capo Colonne Lighthouse bearing 030° and Torre Scifo, about 1 mile southwestward of the lighthouse, bearing 284°.

The coast from Capo Colonne to Porto di Crotone, $4\frac{1}{2}$ miles northwestward, is closely bordered by rocks.

A rock with a depth of less than 1 fathom over it exists about $3\frac{1}{2}$ miles west-northwestward of Capo Colonne Light $\frac{1}{4}$ mile off-shore.

PORTO DI CROTONE

Position: 39°05' N., 17°08' E.

Depths:

Entrance, Port Vecchio, 16 feet.

Quay, Porto Vecchio, 14 feet.

Entrance, Porto Nuovo, 27 feet.

Quays, Porto Nuovo, 30 feet.

Port plan: Section 2B-16.

2B-8 Porto di Crotone, situated $4\frac{1}{2}$ miles northwestward of Capo Colonne, consists of two harbors formed by breakwaters extending southward and northward, respectively, from a point of land on which stands

the city of Crotone. Porto Vecchio, the smaller harbor, is entered from southward, and Porto Nuovo, the larger, is entered from northward.

NAVIGATION

2B-9 From Capo Colonne.—From a position on the coastal track, 4.2 miles south-eastward of Capo Colonne Lighthouse, a course of 329° for 4.3 miles leads to a position 1 mile northeastward of the same lighthouse, from whence a course of 311° for the same distance leads to a position about 1 mile eastward of the dividing point of the harbors.

To the Adriatic.—From the entrance of Porto Nuovo, a course of 057° for 72 miles joins the coastal track 4 miles southeastward of Capo Santa Maria di Leuca Lighthouse.

CURRENT—WINDS—WEATHER

2B-10 The current near the port is weak and variable. As a rule, it follows the direction of the wind, particularly southeasterly and northerly winds.

The Tramontana and winds from the northeast through southeast prevail during winter. In spring, northeasterly winds prevail. At times, fog becomes so thick that the coast cannot be seen.

During winter, low waters in the port indicate northerly winds; in summer they indicate good weather. High waters indicate bad weather from the southwest and southeast.

DEPTHS

2B-11 The controlling depth in the entrance and in the outer port of Porto Vecchio is 16 feet. The harbor is subject to silting. In Porto Nuovo the depths are from 16 to 27 feet with 27 feet in the entrance. There are 5 to 7 fathoms in the approach.

It was reported (1962) that depths in the entrance channel and those leading to Mole Giunte were less than charted.

LANDMARKS

2B-12 Conspicuous from a considerable distance are two large factories and a cemetery surrounded by a low wall situated in an

isolated position about 1 mile southward of the city. A fort with high bastions standing on a point, 141 feet high, seaward of the city is particularly prominent.

ANCHORAGE

2B-13 Vessels can anchor in about 14.6m (8 fm), good holding ground, about midway between Capo Colonne and Crotone, with the disused signal station westward of the cape bearing 180° and the northern angle of the fort at Crotone bearing 325°. Another anchorage southeastward of Crotone in about 13m (7 fm) exists with the cemetery bearing 255° and the light structure near the head of Porto Vecchio mole bearing 330°.

HARBORS

2B-14 Porto Vecchio, east-southeastward of the city, is protected by a breakwater that extends in a general southerly direction for about 500 yards from a position eastward of the fort. Quays line the northern part of the harbor but are fronted by shoal water. A pier extends southeastward from a point on the middle western side of the harbor and to southwestward of it is a small concrete landing wharf. Shallow water lies for a distance of about 300 yards eastward of the breakwater and about 100 yards southward of its head.

A light is shown near the end of the breakwater at Porto Vecchio. Recognition of the light is at times very difficult because of the illumination of the mole and some bluish lights to the northwestward of the port.

The port affords good shelter and can accommodate vessels not exceeding 230 feet in length and 16 feet in draft.

Porto Nuovo lies northeastward of the city and is protected to eastward by Molo Foraneo, a breakwater that extends about 3/4 mile north-northwestward from the root of the breakwater at Porto Vecchio. Mola Giunti extends 400 yards north-northeastward from the northern part of the city. The harbor is accessible to vessels up to about 420 feet in length, and drawing less than 26 feet. Quays form the southern part of the harbor but are fronted by shoal water. A mooring buoy used for warping vessels berthed at the mole is moored on the north-

ern edge of the shallow water about 300 yards south-southeastward from the head of Molo Giunti. Two mooring buoys for warping or for stern mooring are moored at the head of the harbor.

A light is shown on the head of Molo Foraneo.

Two lights displayed vertically, are shown from the head of Molo Giunti.

Three lights, displayed vertically, are shown from a chimney, 500 feet high with red and white bands, about 1 mile westward of the entrance.

PILOTAGE

2B-15 Pilotage is compulsory for vessels exceeding 500 tons. Previous notice is required when entering at night. There are no tugs.

FACILITIES

2B-16 Crotone is an industrial and shipping city of about 40,000 population. It is built on a point, 141 feet high, and extends westward and southward of a central fort situated between the two harbors. The principal industries are wood and agricultural products, the manufacture of fertilizers, and the refining of tin.

In Porto Vecchio are alongside depths of 4.2m (14 ft.)

In Porto Nuovo there are depths of about 9.1m (30 ft.) alongside Molo Giunti and the middle part of Molo Foraneo, but the quay at the head of the harbor is fronted to a distance of about 230 feet by a shoal bank.

A few lighters are available. Except for coal and ore discharging equipment. Quays in New Port have electric cranes up to 8 tons.

Repairs.—Minor machine shop work and repairs to hulls and engines of small vessels can be accomplished. Two small marine railways and a diver are available.

Supplies.—Large stocks of fuel oil, diesel fuel, and gasoline are normally maintained. Fresh provisions are plentiful and fresh water is available.

Communication.—The city is served by a good motor road to the railway station, about 1½ miles distant. There is regular steamship service with other Italian ports. There is telegraph and telephone service and a radio station.

Hospital.—There is a 50-bed hospital that will receive seamen.

PART C. GOLFO DI TARANTO

2C-1 Capo Colonne (39°02' N., 17°12' E.), the southwestern entrance point of Golfo di Taranto, is described in section 2B-7.

COAST—GENERAL

2C-2 Golfo di Taranto is entered between Capo Colonne and Capo Santa Maria di Leuca, about 72 miles northeastward. The western side of the gulf is backed by the mountains of the Appennino Calabrese with some remarkable summits that are visible from a great distance. The northeastern side of the gulf is low and flat; it forms the southern boundary of the Salentina, a large plain. All the shores of the gulf are bordered by a sandy beach which, in general, fringes marshy ground and contains many river mouths. Numerous towers and villages stand on the shores of the gulf.

DANGERS

2C-3 The gulf is free of offshore dangers and has depths greater than 915m (500 fm). The 6-fathom curve varies from about 300 yards to 2 miles offshore, no dangers existing beyond the greater distance.

NAVIGATION

2C-4 To ports in gulf, see descriptions of ports.

Across entrance of gulf.—From a position 4 miles southeastward of Capo Colonne Lighthouse, a course of 050° for about 71 miles leads to a position 4 miles southeastward of Capo Santa Maria di Leuca.

CURRENT AND WIND

2C-5 Current.—A southerly current generally sets along the western shore. Southerly winds influence its direction, and when fresh and of long duration, or before a strong southeasterly wind, the current may set northward. The current on the eastern shore is affected equally by wind, a northwesterly current resulting frequently from strong southerly winds.

Winds.—In winter northeasterly winds prevail, and last usually from three to seven days. Southerly winds are violent and of less duration but raise a heavy sea. In summer after a period of calm there are sometimes strong northwesterly to northeasterly winds of short duration called *tormenta*

which are accompanied by thick clouds on the horizon and lightning.

**LANDMARKS—COASTAL FEATURES
WESTERN SIDE OF GOLFO DI
TARANTO**

2C-6 The coast between Crotone and Punta Alice, 19 miles northward, consists of a beach alternating between sand and gravel. Fiume Neto, 7 miles northward of Crotone, enters the sea through a densely wooded mouth that extends several miles eastward of the general coast line. A steel railway bridge and two red silos are conspicuous from southeastward. The conspicuous yellow railway station of Strongoli surrounded by lower white buildings lies $\frac{1}{2}$ mile northward of the wooded area.

The most prominent landmark to be seen afar and from any direction is the white church of San Nicola dell'Alto which is built on a saddle in the mountains, 1,890 feet high, between a pointed and a rounded summit, 10 miles northwestward of the mouth of Fiume Neto. Also prominent is the village of Strongoli situated on a flat-topped hill, 1,112 feet high, midway between San Nicola dell'Alto and the river mouth. A stranded wreck lies close to the beach about $7\frac{1}{4}$ miles northward of the entrance of Fiume Neto.

The village of *Ciro Marina*, 2 miles south-southwestward of Punta Alice, stretches along a beach of coarse sand. Anchorage may be had off the town; it is good with northerly winds but not advisable with southeasterlies. The town of *Ciro* is situated on a green hill 1,152 feet high, about 3 miles westward of the marina. It is distinctly visible a great distance from all directions. There is a white signal station on the summit of *Serra Sanguigna*, a bare cupola-shaped hill $\frac{1}{2}$ mile west-northwestward of *Ciro*. The station is closed normally to traffic.

2C-7 Punta Alice (39°24' N., 17°09' E.) is a low bare strip of sand having deep water close-to. The land is covered with vegetation westward of the point.

Punta Alice Light is shown on the eastern extremity of Punta Alice.

At times, a current sets from eastward and divides into two branches, one flowing southward and the other northwestward.

2C-8 The coast, consisting of a sandy beach, trends northwestward from Punta Alice for 8 miles to Punta Fiumenica, a low projection through which flows a river, whence it continues in the same direction for $14\frac{1}{2}$ miles to Capo Trionto. Madonna di Mare, a small conspicuous church, lies about $1\frac{1}{2}$ miles west-northwestward of Punta Alice. **Anchorage** may be obtained off the church with protection from southeasterly winds. Torre Policaretto, situated on Punta Fiumenica, is conspicuous from a great distance. It consists of two entirely separated ruined fragments that appear from a distance as if rising from the sea. **Anchorage** can be had about 1 mile southeastward of Torre Policaretto and is good in fair weather or with offshore winds.

Monte Acquaviva, 1,465 feet high, and Pietra dell'Avvoltoio, 2,047 feet high, are two prominent landmarks. The former is situated about 12 miles west-northwestward of Punta Alice, and the latter is about 2 miles farther westward and is tree-covered.

A number of small inland villages along this stretch of coast form excellent landmarks.

Capo Trionto ($39^{\circ}37' N.$, $16^{\circ}46' E.$), located about 22 miles northwestward of Punta Alice, is low and covered with vegetation. A river of the same name flows through the point.

Capo Trionto Light is shown on the point at the western bank of the river mouth.

2C-9 The coast from Capo Trionto trends westward for about 10 miles whence northward for about 4 miles to Punta Coscio, a flat heavily-wooded point through which Fiume Crati discharges into the sea by two mouths. After heavy rain the sea is discolored for about 1 mile offshore.

The houses of the village of San Angelo di Rossano, $5\frac{1}{2}$ miles westward of Capo Trionto, are obscured by trees but some factory chimneys are prominent from a short

distance. The town is the best landmark for a landfall. Vessels steer for the town when the central section bears 180° . Sometimes the smoke from the factory chimneys may be seen and used as a guide. In good weather, vessels anchor in front of the village in 37m (20 fm) and about 160 yards offshore, their sterns are secured to mooring posts on the beach. Vessels should leave the anchorage on the first indication of onshore winds. There is a short pier at the village. Provisions and water are available in small quantities. There are telegraph and telephone facilities at Rossano. The town of Rossano, 3 miles southward, stands on a tree-covered hill, 974 feet high. The village of Schiavonea, port of Corigliano Calabro and a watering resort, is situated 5 miles west-northwestward of San Angelo di Rossano. A large tower and the houses stand out prominently for a distance of 10 miles. Two buildings with colonnades and two dark red tanks become conspicuous farther inshore. Corigliano Calabro, 4 miles southward of the port, has a conspicuous white castle visible 10 miles.

The beach between Capo Trionto and the mouth of Fiume Saraceno, $7\frac{1}{2}$ miles northward of Punta Coscio, is undulating and composed of alluvial deposit from the numerous torrents. Northeastward of the latter the character of the shore alters, the hills standing closer to the beach. When dry, the river bed of Fiume Saraceno is visible from a great distance offshore.

Excellent landmarks are two pointed peaks rising above an imposing mountainous mass inland about 11 miles northwestward of Punta Coscio, and known as Due Sorelle. The larger one, Pizzo delle Armi, is 4,721 feet high, and the other, Monte Pellari, is 4,383 feet high.

The village of Trebisacce, 1 mile northeastward of the mouth of Fiume Saraceno, stands on a spur, 240 feet high, that slopes steeply toward the sea. Trebisacce Marina is built on the beach close southeastward of Trebisacce. Prominent in the village are a high chimney, a long wall with arches, and a steel bridge. There is a short pier in dis-

repair. Small quantities of provisions, water, coal, and fuel oil may be obtained.

2C-10 Capo Spulico ($39^{\circ}58' N.$, $16^{\circ}38' E.$), 68 miles north-northwestward of Capo Rizzuto and $7\frac{1}{2}$ miles northeastward of Trebisacce, is very low and partially covered with bushes. The cape extends slightly eastward and through it flows Fiume Ferro. A steel railway bridge crosses the river about $\frac{1}{4}$ mile from its mouth.

A wreck lies in a depth of about 32m (17 $\frac{1}{2}$ fm) in a position about 3 $\frac{3}{4}$ miles north-northeastward (PA) of Capo Spulico.

Banco di Amendolara, with a least depth of 26m (14fm), lies about 7 miles southeastward of Capo Spulico.

2C-11 The coast between Capo Spulico and the mouth of Torrente Canna, $8\frac{1}{2}$ miles northward, is high, but from the latter to Punta Rondinella, 34 miles northeastward, it is low, marshy, wooded in places, and intersected by many torrents and rivers. It is for the most part uninhabited and the river mouths, which are hidden by low scrub, are difficult to distinguish.

Montegiordana Marina, about $4\frac{3}{4}$ miles north-northwestward of Capo Spulico, shows two pairs of low gray chimneys and a conspicuous shed near a factory cableway.

Scoglio Cervaro is a low black rock situated close to the coast about $2\frac{1}{2}$ miles northward of Montegiordana Marina. It is visible against the light-colored beach for a distance of about 6 miles.

Marina di Rocca Imperiale is situated near the southern mouth of Torrente Canna and consists of red and white buildings. Prominent are a tank, the dark yellow railway station, and Torre Canna, quadrangular and surmounted with two white sentry boxes and a tall white column. Anchorage is available off the village near Torre Canna in about 14.7m (8 fm), sand and mud, good holding ground.

Fiume Sinni flows into the sea about 4 miles northeastward of the mouth of Torrente Canna, its mouths forming a sandy point projecting some distance eastward. Between this river and Fiume Agri, 4 miles north-northeastward, are several lagoons and marshes, the country behind being well

wooded. Muddy river water sometimes extends as much as 2 miles offshore.

Two buoys, each with a radar reflector, are moored about 11 and $12\frac{1}{4}$ miles northeastward of the mouth of Torrente Canna.

Caution.—Because of silt from the above rivers, the depths in their vicinity are liable to be different than charted.

Torre Scanzano ($40^{\circ}15' N.$, $16^{\circ}45' E.$), situated in an isolated position near the beach $3\frac{1}{2}$ miles north-northeastward of the mouth of Fiume Agri, is a dark-colored truncated cone-shaped structure surmounted with a hutch. The seaward side is painted in black and white horizontal bands.

Torre Mattoni, half in ruin and slightly darker than Torre Scanzano, stands near the edge of the beach about $10\frac{1}{2}$ miles north-northeastward of the latter. There is a conspicuous two-story red building about $\frac{3}{4}$ mile west-southwestward of the tower. The conspicuous railway station of Metaponto with a large water tank and surrounding dwellings is located about 3 miles southwestward of Torre Mattoni.

The railway station of Ginosa, surrounded by red and yellow houses, is situated 2 miles northeastward of Torre Mattoni. On the beach close to the station there is a tower on a two-story house, from the northern side of which a light is shown.

A minefield exercise area, with a radius of $\frac{1}{2}$ mile, lies about 3 miles eastward of Ginosa. This area is prohibited to navigation.

Along this coast are three prominent cylindrical pillars painted in black and white stripes.

Torre Lato, situated on the beach southwestward of the mouth of Fiume Lato, about $7\frac{3}{4}$ miles northeastward of Torre Mattoni, is low, white, quadrangular, and has a superstructure. It stands out prominently against the trees. A bridge crosses the river close to its mouth.

2C-12 The coast from Torre Lato to Punta Rondinella, 9 miles eastward, forms a bight to northward. The coast is low, wooded, and intersected with marshes. Northward is a cultivated plain dotted with houses.

Punta Rondinella is low and narrow and surmounted by a quadrangular tower of the same name. About one mile northeastward of the point is Torre Montello, thin and quadrangular with three rows of windows. This structure is a conspicuous landmark from seaward. A conspicuous chimney surmounted by a flare is located about 350 yards northeastward of Torre Montello.

Secca Armeleia with a least depth of $4\frac{1}{3}$ fathoms over rock and weed lies about $3\frac{1}{4}$ miles eastward of Torre Lato. Seas break over this reef during strong southerly winds. Several isolated shoal patches lie eastward and southeastward of Secca Armeleia and close to Punta Rondinella.

A buoy with a radar reflector is moored about 6 miles west-southwestward of Punta Rondinella.

Torpedo range.—There is a torpedo range along the line joining Torre Lato and Torre Montello, about 9 miles eastward. The range has a length of about $1\frac{1}{2}$ miles and is marked by conical buoys moored either singly or in pairs.

A charted prohibited area is centered about 4 miles west-northwestward of the light structure on the head of Diga di San Paolo.

LANDMARKS—COASTAL FEATURES NORTHEASTERN SIDE OF GOLFO DI TARANTO

2C-13 The coast between Punta Meliso, the southwestern extremity of the headland of Capo Santa Maria di Leuca, and Punta Ristola ($39^{\circ}47' N.$, $18^{\circ}21' E.$), 1 mile west-southwestward, recedes to form a small bight on the shores of which is located the village and watering resort of Leuca. Anchorage is available in 6 fathoms about 600 yards off the village and midway between the two entrance points of the bight. A small landing pier with about 5 feet of water at its head is located in the northeastern part of the bight. A small marine railway is available. Fresh provisions and water can be procured in small quantities.

A light is shown about 300 yards north-northeastward of Punta Miliso. An auxiliary light is also shown from this lighthouse.

Banco la Scala with depths of less than 10 fathoms shoaling to less than 6 fathoms 550 yards offshore extends about $1\frac{3}{4}$ miles southeastward from Punta Ristola.

The coast between Torre Vado, cylindrical, well preserved, and about 4 miles northwestward of Punta Ristola, and Torre I Pali, which is almost completely in ruins and situated on the southeastern extremity of a low tongue of land, $3\frac{1}{4}$ miles farther westward, is fronted by a reef with depths of less than 3 fathoms.

Torre San Giovanni, surrounded by fishermen's huts, is situated on a rocky point $5\frac{1}{2}$ miles northwestward of Torre I Pali. Torre Mozza stands isolated on the shore midway between Torre I Pali and Torre San Giovanni. A light is shown from Torre San Giovanni.

2C-14 Off-lying dangers.—Secca di Ugento extends nearly 2 miles southwestward from Torre Mozza. Depths of less than 3 fathoms exist on the reef, the southern extremity being marked by two large rocks awash. Secca di Ugento Buoy, cylindrical and fitted with a radar reflector, is moored off the southern extremity of the reef. Secca del Polombaro is another reef with less than 3 feet of water lying about 1 mile westward of Torre Mozza. La Giurlita is an above-water rock about $1\frac{1}{4}$ miles westward of the same tower. Depths of 7 to 16 fathoms lie about 6 miles south-southwestward of Torre Mozza.

About 250 yards southeastward of Torre San Giovanni a ridge of rocks runs for a distance of about 1,300 yards parallel to and at a distance from the shore of about 200 yards, the largest of which, Scoglio Tondo, has a rounded top. From seaward the ridge appears as seven distinct rocks.

The reefs are covered by the red sector of Torre di Giovanni Light and the red sector of the light on the signal station near Capo Santa Maria di Leuca Light (sec. 3A-1).

Caution.—During reduced visibility in the vicinity of the reefs, mariners are advised to keep offshore of depths less than 16 fathoms. At times a westerly current sets on Secca di Ugento.

Fishing nets.—Tunny nets are set within a radius of $3\frac{1}{4}$ miles from Torre San Giovanni. The area is not restricted, however, the nets being set at the owners' risk. Nets are set also about $\frac{3}{4}$ mile north-northwestward from the coast close to Punta del Pizzo, 9 miles northwestward of Torre San Giovanni. These nets are set in February and removed in November. Nets are also set about 10 miles southeastward of Torre San Giovanni; they extend about 1 mile southwestward from the shore. Another net extends westward for about $\frac{3}{5}$ mile from Torre Suda.

2C-15 The coast from Torre San Giovanni to Punta del Pizzo, 9 miles northwestward, is low and rocky with the hillsides dotted with numerous buildings which decrease in number northward. Torre Suda, about $5\frac{1}{2}$ miles north-northwestward of Torre San Giovanni, is a white cylindrical tower with a rectangular superstructure. Close southward of the tower is a basin for small boats.

Between Punta del Pizzo and Gallipoli, $3\frac{1}{2}$ miles north-northwestward, the coast recedes to eastward forming a bay with a sandy beach for the most part. Punta del Pizzo extends somewhat northwestward and is surmounted by a small white cylindrical turret with windows. For tunny nets set off Punta del Pizzo, see section 2C-14.

The description of the coast northwestward of Gallipoli is continued in section 2C-26.

PORTO DI GALLIPOLI

Position: $40^{\circ}03' N.$, $17^{\circ}50' E.$

Depths:

Entrance, 26 feet.

Anchorage, 9 fathoms.

Harbor, 26 feet.

Quays, 10 to 26 feet.

Port plan: 2C-25.

2C-16 Porto di Gallipoli consists of a mole-protected harbor situated immediately northward of a low point of land and a closely off-lying island, $3\frac{1}{2}$ miles north-northwestward of Punta del Pizzo.

NAVIGATION

2C-17 From Capo Colonne.—From a position 4 miles southeastward of Capo Colonne Lighthouse, a course of 025° for 71 miles

leads to a position 2 miles westward of Isola San Andrea.

From Porto di Taranto.—See section 2C-31.

To the Adriatic.—From westward of Isola San Andrea, general southerly courses to maintain an offing of about 4 miles for a distance of 33 miles lead to the coastal track in a position 4 miles southeastward of Capo Santa Maria di Leuca Lighthouse.

DEPTHS

2C-18 The depths in the approach are over 10 fathoms, and those in the anchorages are about 9 fathoms. A draft of 26 feet can be carried in the harbor. A 787 foot berthing length along Molo Foraneo has 26 feet alongside. Because of underwater foundations the remaining length of Molo Foraneo and Molo di Tramontana should not be approached closer than about 33 feet by vessels drawing more than 10 feet.

OFF-LYING ISLANDS AND DANGERS

2C-19 Isola San Andrea, about $\frac{1}{2}$ mile in diameter, lies about $\frac{3}{4}$ mile westward of Gallipoli. The island is low and almost completely inundated by the sea during strong southeasterly winds. It has a fringing shoal with depth of less than 5 fathoms which extends 300 yards from the southwestern side, and 200 yards from the southeastern.

A reef with many rocks and with depths of less than 3 fathoms extends about 500 yards westward and southwestward from the island on which Gallipoli stands. Scoglio Campo and Scoglio Piccioni are two of the largest rocks and lie close to the western edge of the reef. The former is about 13 feet high.

Secca del Rafo with a depth of 8 feet over rock and with a diameter of about 150 yards lies $\frac{1}{4}$ mile north-northwestward of the head of the harbor mole. A buoy showing a flashing white light is moored near the northeastern extremity of this reef. It is advisable to give this buoy a berth of at least 250 yards as it has a long mooring chain, it may also be out of position.

Caution—Fishing nets.—Tunny nets extend about $1\frac{1}{4}$ miles north-northwestward

from a position on the coast about 0.7 mile west-northwestward of the head of the harbor mole. These nets are set in February and removed in November. Fish traps are set in the area between the coast and a line joining Torre Colimena (sec. 2C-28) and a position $5\frac{1}{4}$ miles 240° from Isola San Andrea Light-house. It is advisable to stay out of this area, which is known as Ovadi; vessels may become liable for damages which they cause to the traps within the area. These traps are placed the year round. For the position of nets in the southern approach to Porto di Gallipoli see section 2C-15.

LANDMARKS

2C-20 Though the coast is generally low there are two villages that appear prominently from a distance; Madonna dell'Alto, $5\frac{1}{2}$ miles northward of Gallipoli and $\frac{1}{4}$ mile inland; and Grosso di Racale, about 8 miles southeastward of the town and 3 miles inland. The former stands on a hill, 246 feet high, and consists of a few houses. The latter is located on an olive tree-covered ridge, 330 feet high, that extends in a north-west-southeast direction.

The following are conspicuous from a position closer inshore and from both the northern and southern anchorages: Castello Revellino at the extreme eastern part of the island on which Gallipoli is built; the large building with a quadrangular turret of the Collegio del Sacro Cuore situated about $\frac{1}{2}$ mile eastward of the tip of the point; and Casa Vallebona with a turret and red and white checkered roof close northward of the college. Both turrets rise above all buildings.

From positions northward and northwestward, two chimneys near the shore of the point appear conspicuous, one of the Societa Gallipolini about 1 mile east-northeastward of the castle, and the other with a square base and connected to Casa Lupi, 800 yards farther northeastward.

NAVIGATIONAL AIDS

2C-21 Isola San Andrea Light is shown from the southwestern side of the island.

A light is shown from the head of the harbor mole.

The western entrance point to Seno del Canneto (sec. 2C-23) is marked by a light. A light is shown from the head of the mole forming the eastern side of the basin.

Secca del Rafo Light Buoy is described in section 2C-19.

ANCHORAGES

2C-22 During the season when tunny nets are not set the recommended anchorage northward of the town is in about 14.7m (8 fm) on a bearing of 180° from the Port Captain's Office and in a position equidistant from the head of the mole and Secca del Rafo Light Buoy. When nets are set a vessel should anchor westward of a line joining the head of the mole and the buoy. The Port Captain's Office is a quadrangular building standing apart on the quay at the eastern end of the masonry bridge connecting the point with the island.

The recommended position for anchoring in the southern anchorage is in about 16.5m (9 fm) of water with the eastern entrance point of Seno del Canneto bearing 000° and the northern point of Scoglio Campo in range with the southern bastion of the town.

A mooring buoy is located about 125 yards off Banchina del Lido.

HARBOR

2C-23 From the northern part of the island on which stands Gallipoli, a narrow mole extends 75 yards north-northwestward, whence Molo Foraneo extends 340 yards northeastward. Molo di Tramontana is a 190-yard extension east-northeastward of the latter.

Bachina del Lido, about 180 yards long, and Bachina della Ferrovia, to eastward and about 200 yards long, form the quayed southwestern part of the harbor.

There are two buoys off the southwestern quays used for mooring and warping.

Seno di Ponente is a shallow depth basin southwestward of Molo Foraneo. It is entered from northward between two moles.

Seno del Canneto is another and larger basin lying southeastward of Castello Revelino. It is entered from southward between a breakwater and a point of land.

Warning.—Vessels remaining in port for a stay of considerable length are advised to be well secured, or if at anchor to use both anchors, since there is no protection from strong winds from any direction.

PILOTAGE

2C-24 Pilotage is compulsory and vessels are met by the pilot boat off the entrance.

FACILITIES

2C-25 Gallipoli stands on a rocky island about 550 yards in diameter. The town has an oriental

aspect and is surrounded by ancient bastions. The old town is connected by a masonry bridge, 150 yards long, to a low point of the mainland on which is located the new quarter. The town had a population of about 18,000 in 1962. There is a moderate import and export trade.

Berths.—Merchant vessels are berthed customarily at Bachina del Lido, 540 feet long with a depth of 7.1m (23 ft.), which with Bachina della Ferrovia are served by double railway tracks. The tracks, however, are too removed from the quay side for ship's cargo to be worked directly into railway cars.

A 787 foot berthing length along Molo Foraneo, which is usually reserved for naval craft, has 8m (26 ft) alongside.

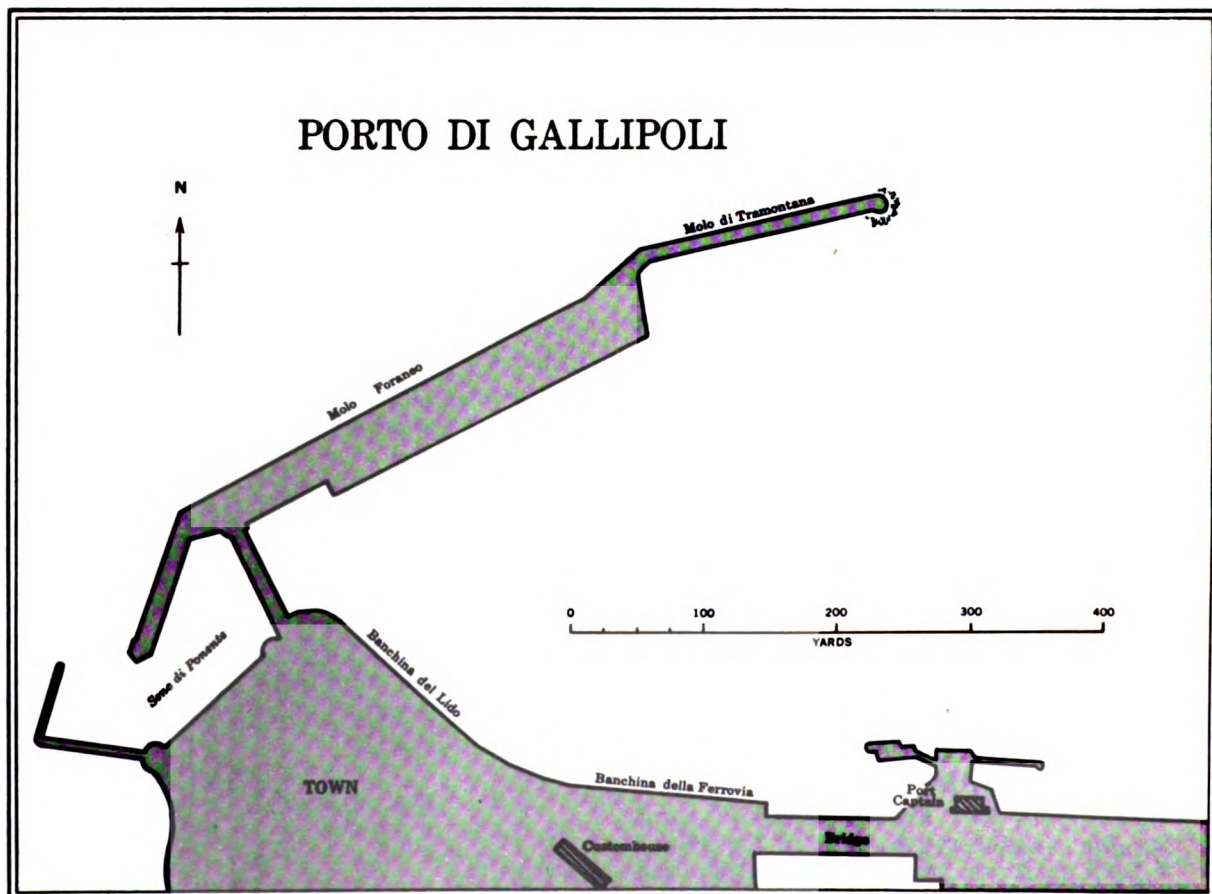
There are several cranes up to 10-ton capacity.

Repairs.—Small repairs can be made. A diver and a small marine railway are available.

Supplies.—Water is available at the quays. Fresh provisions are procurable.

Communications.—Gallipoli is a regular port of call of several Italian lines. There is a railway station, telegraph and telephone service. A good motor road leads to Lecce and Brindisi.

Hospital.—There is a 350-bed hospital.



LANDMARKS—COASTAL FEATURES, NORTHEASTERN SIDE OF GOLFO DI TARANTO (Continued)

2C-26 The coast between Gallipoli and Torre Squillace, $11\frac{1}{4}$ miles north-northwestward, is wooded in places, and sandy and rocky at intervals. There are several coves along this stretch of coast and there is a large bight close northward of Gallipoli. Several towers stand on the shore, the most readily identified one by offshore traffic from a distance up to 6 miles being Torre dell'Inseraglio, 3 miles southward of Torre Squillace. It is whitish and appears to rise from the sea.

Insenatura Santa Maria del Bagno, a cove about $4\frac{1}{2}$ miles northward of Gallipoli, provides anchorage for medium size vessels in $4\frac{1}{2}$ fathoms, sand, in a position midway between and inshore of a line joining the entrance points of the cove.

Tunny nets are set about $1\frac{1}{4}$ miles southward of Torre Squillace and extend about 1 mile from shore.

Between the root of Penisola della Straga, close northward of Torre Squillace, and a point, 4 miles northwestward, are three contiguous bights, the westernmost one being known as Porto Lapillo, and the easternmost and best protected one being known as Porto Cesarea. Towers stand on the entrance points of each of the two western coves.

2C-27 Porto Cesarea (Cesareo) ($40^{\circ}15' N.$, $17^{\circ}54' E.$) lies between Penisola della Strega and several islets and rocks on its southwestern side, and the mainland shore of a bight on its eastern and northern sides. The harbor affords secure anchorage in 6 to 14 feet in an area $\frac{1}{4}$ mile in diameter, about $\frac{1}{4}$ mile southeastward of Torre Cesarea, situated on the southern end of a point at the northern side of the harbor.

Torre Cesarea is a large quadrangular building close northward of which lies the village of the same name. A crude boat landing exists at the foot of the tower. About $1\frac{1}{4}$ miles northeastward of the tower there

is a conspicuous massive grayish building, La Salmenta, which is the lowest of three ruined masses.

Range lights are shown from a framework structure on each of two quadrangular concrete huts, painted in black and white checkers, situated on the shore northeastward of Torre Cesarea. These lights in range bearing 034° – 214° lead through the narrow channel in the reefs to the anchorage.

Wrecks lie about $5\frac{1}{4}$, $8\frac{1}{2}$, and 9 miles southwestward, respectively, of Porto Cesarea; another wreck lies about 5 miles southward of the port. All these wrecks are considered dangerous to navigation.

2C-28 The coast between the western entrance point of Porto Lapillo (sec. 2C-26) and Torre dell'Ovo, $15\frac{1}{2}$ miles westward, is generally low and rocky with some sandy beaches. Several towers, most of which are conspicuous, stand on the coast. Torre Colimena, situated on a point 11 miles eastward of Torre dell'Ovo is the tallest.

Torre dell'Ovo ($40^{\circ}18' N.$, $17^{\circ}30' E.$), surmounted by a white hut and staff, the whole edifice being 56 feet high, is situated on a small rocky point which is flanked closely on either side by a similar point.

A **tunny net**, during the month of March, extends from the shore near Torre dell'Ovo in a southerly direction for about one mile.

Secca di Torre dell'Ovo, with a least depth of 18 feet, extends about $1\frac{1}{2}$ miles south-southeastward of the tower. A reef with a depth of 12 feet lies shoreward of the shoal.

Between Torre dell'Ovo and Capo San Vito, $15\frac{1}{2}$ miles west-northwestward, the coast is generally low, rocky, and irregular. Prominent from a distance offshore are the villages of Roccaforzata, about $8\frac{3}{4}$ miles east-northeastward of Capo San Vito and 5 miles inland, and Leporano, about 6 miles east-southeastward of the same point and $1\frac{1}{2}$ miles inland. The former stands on a hill, 476 feet

high, and contains a conspicuous many-cornered castle. The latter has an elevation of 154 feet and is distinguished by a quadrangular castle with a low squat tower.

Several towers are conspicuous along this part of the coast. Torre San Vito, light-colored and quadrangular, stands close to the sea about 1 mile east-southeastward of Capo San Vito Lighthouse and should not be confused with the tower of the same name on the cape.

Porto di Taranto is entered westward of Capo San Vito and is described in section 2C-30.

2C-29 Submarine exercise area.—Italian submarines frequently exercise in an area about 20 miles south-southeastward and south-southwestward of the entrance of Taranto, (see sec. 1-11).

PORTO DI TARANTO

Position: 40°27' N., 17°12' E.

Depths:

Mar Grande, 6 to 17 fathoms.

Mar Piccolo, 22 to 42 feet.

Porto Mercantile, 30 feet.

Tide: Mean range, 0.4 foot; spring range, 0.7 foot.

Port plans:

Plan A, general, section 2C-35.

Plan B, Porto Mercantile, section 2C-48.

2C-30 Porto di Taranto consists of Mar Grande, an outer harbor about 3 miles in diameter and well protected by breakwaters; Mar Piccolo, an inner harbor consisting of two bays; and Porto Mercantile, a quayed smaller basin. The port is primarily a naval base. It is entered between Punta Rondinella (sec. 2C-12), on the northern side, and Capo San Vito, 4½ miles south-southeastward. The city is built on a rocky tongue of land that separates Mar Piccolo, on its northeastern side, and Mar Grande, on its southwestern side. Mar Grande and Mar Piccolo are connected by an artificial passage, about 300 yards long and 240 feet wide, cut through the city.

NAVIGATION

2C-31 From Capo Colonne.—From a position 4 miles southeastward of Capo Colonne Lighthouse, a course of 357° for 86 miles leads to Porto di Taranto, passing about 3.5 miles eastward of Punta Alice, the northeasternmost point on the western side of the gulf.

From Gallipoli.—From a position 2 miles westward of Isola San Andrea, off Gallipoli, a course of 302° for 39 miles leads to a position 1 mile westward of Capo San Vito.

To the Adriatic.—From a position 1 mile southwestward of Capo San Vito, a course of 129° for 55 miles leads to a position 1 mile southwestward of Secca di Ugento Buoy, from whence a course of 106° for 15 miles joins the coastal track at a position 4 miles southeastward of Capo Santa Maria di Leuca Lighthouse.

CURRENT AND WIND

2C-32 Current.—The current off Mar Grande sets westward. It is usually weak and felt only during strong easterly winds.

Wind.—From September to March winds alternate usually between northwest and northeast. The northeasterly winds uninterrupted by the plain of Salentina (sec. 2C-2), blow sometimes with such force as to render boat communication with shore difficult, even in Mar Piccolo. Northeasterly winds generally prevail for days, diminishing in force to a calm at night and in the early morning hours, but blowing with force during other hours.

Southwesterly winds raise a lively sea and cause high water in Mar Grande.

Southeasterly winds, especially in winter, are strong and disturb cargo handling by vessels berthed in Porto Mercantile. These

winds bring mist and rain especially during May and June.

In spring, strong westerly gusts of winds blow over the roads. They are generally of brief duration and slacken towards sunset.

Easterly and southerly winds bring fog.

DEPTHS

2C-33 The depths in the approach to the port are well over 37m (20 fm) and a least depth of 28m (15 fm) can be maintained through the outer entrance. The depths in the frequented part of Mar Grande are from 11m (6 fm) to 31m (17 fm). The western bay of Mar Piccolo has depths of from 9.2m (5 fm) to 12.8m (7 fm) and the eastern bay has 7m (3 3/4 fm) to 10.5m (5 3/4 fm). A draft of 30 feet can be carried in Porto Mercantile.

LANDMARKS

2C-34 The heights containing several prominent villages that extend northwestward from Taranto are conspicuous from well offshore. Torre Rondinella and Torre Montello (sec. 2C-12) are also conspicuous.

Isolotto San Pietro, the larger of two islets fronting Mar Grande to westward, is low, rocky, and irregular in shape. It is located about 1 1/2 miles southwestward of Punta Rondinella and has a greatest breadth of 1 1/4 miles. There are numerous buildings on the islet, the most conspicuous being the white round Torre Vedetta in the northern central part, a disused framework structure on the western point, and some red sheds near the eastern point.

Isolotto San Paolo lies 3/4 mile southeastward of Isolotto San Pietro to which it is connected by a breakwater. A light structure stands on the extremity of a short breakwater extending east-southeastward from the eastern side of the islet.

Conspicuous on Capo San Vito to southward of Mar Grande are the lighthouse; Torre San Vito, large, light-colored, and quadrangular; and a four-story signal tower. Airplane hangars situated about 3/8 mile east-northeastward of the lighthouse are particularly conspicuous and can be seen for a distance of about 13 miles. Torre San Vito should not be mistaken for the one of the same name described in section 2C-28.

The castles of Roccaforzata and Deporano (sec. 2C-28) are prominent to southeastward of the city.

The most conspicuous objects visible in Mar Grande are the campanile of San Cataldo, rising above all the buildings in Taranto Vecchio; Castel San Angelo on the western point of the entrance to Mar Piccolo; and Palazzo del Governo, to eastward of the entrance.

HARBORS—MAR GRANDE

2C-35 Breakwaters.—From Punta Rondinella, which is low, a breakwater curves gently southwestward and southward to Punta Lo Scanno, the northern point of Isolotto San Pietro. About 650 yards southwestward of Punta Rondinella, there is a passage about 100 yards wide with least depths of 7m (23 ft.) in it through the breakwater. On the eastern side of Isolotto San Pietro about 1/4 mile southward of Punta Lo Scanno there is a stone landing pier with a crane at its head, close to which is a depth of 4m (13 ft.).

Another breakwater connects Isolotti San Pietro and San Paolo. A short breakwater extends for 400 yards east-southeastward from the southeastern side of the latter and forms the northwestern entrance point of Mar Grande. On the northeastern side of the latter islet there is a boat basin formed by

a mole. The basin with a depth of 3.6m (12 ft.) is reserved for naval use.

From a position 1 mile north-northeastward of Capo San Vito, Diga di San Vito extends nearly 1 mile northwestward and forms the southeastern entrance point. The entrance between the breakwaters is 1,600 yards wide.

On the southeastern side of Mar Grande, from a position 1 1/4 miles east-northeastward of the root of Diga di San Vito, Diga della Tarantola extends about 1 1/4 miles north-northwestward on a shoal of the same name. There are two passages through this breakwater. The southern one is about 100 yards wide with a depth of 8.3m (4 1/2 fm) in it. The northern passage is shallow.

Midway between the roots of Diga di San Vito and Diga della Tarantola, SAN VITO PIER extends northeastward about 225 feet. Shallow-draft craft can secure at its head.

Chiapparo Pier, having a Y-head with each head marked by a light, is situated 1,400 yards northeastward of the root of Diga della Tarantola. There is a depth of 9.8m (32 ft.) at its head. About 800 yards north-northeastward there is a shorter pier, northward of which are some obstructions close inshore.

2C-36 EASTERN AND NORTHERN SHORES.—From Chiapparo Pier, the eastern shore of Mar Grande circles northward and northwestward for 2 1/4 miles to Passagio Piccolo (Canale Navigabile), the entrance to Mar Piccolo. For about 3/4 mile southeastward of Passagio Piccolo the buildings of Taranto Nuovo stand close to the shore which consists of a number of quays and basins for boats. From Passagio Piccolo the shore, which fronts Taranto Vecchio, extends 1/2 mile northwestward to the southeastern mole of Porto Mercantile. The shore from the root of the western mole of Porto Mercantile continues westward for nearly 2 miles to Punta Rondinella. ISOLOTTO SAN NICOLICCHIO is located close to the shore nearly 1 mile eastward of Punta Rondinella. Midway between the two there is a stone landing pier.

A detached breakwater, oriented east-southeastward—west-northwestward, lies about 700 yards off the entrance of Porto Mercantile.

2C-37 SHOALS.—The northwestern and northern area of Mar Grande is encumbered with shoals having depths of less than 9.1m (5 fm). Secca di San Vito and Secca della Tarantola, in the southeastern part of Mar Grande, have depths of from 1.9m (1 fm) to 7.4m (4 fm) and lie roughly surrounding and between Diga di San Vito and Diga della Tarantola. Secca della Sirena with a least depth of 6.8m (22 ft.) is a spit extending southward from the northern shoal area about midway between Porto Mercantile and Isolotto Sab Nicolicchio. Its southeastern side is marked by a red cylindrical light buoy.

In the northwestern and northern area, the 5-fathom curve lies westward, approximately, of a line drawn from the head of the breakwater at Isolotto San Paolo to Isolotto San Nicolicchio, and inshore of a line drawn 3/4 mile southward of the northern shore, except for Secca della Sirena, previously mentioned. In the southeastern part of Mar Grande the 5-fathom curve lies inshore of a line drawn between the heads of Diga di San Vito and Diga della Tarantola. In the eastern part of this harbor the 5-fathom curve lies between 100 and 200 yards offshore.

WRECKS lie about 1 mile, 255°, and 875 yards, 002°, respectively, of Diga della Tarantola Light.

Staked fishing areas are on both sides of Diga della Tarantola and along the northeastern shore of Mar Grande.

2C-38 Lights.—Capo San Vito Light is situated about 450 yards northward of the southwestern extremity of the cape. A light buoy, equipped with a radar reflector, is moored about 5 miles west-northwestward of Capo San Vito Light. A light buoy is moored about 1 1/3 miles north-northwestward of Diga della Tarantola head.

Diga di San Vito Light is situated on the head of the breakwater.

Isolotto San Paolo Breakwater Light is shown on the head of the breakwater.

Two LIGHTS, vertically disposed, are shown on San Vito Pier.

A LIGHT is shown on either side of the entrance to the small boat basin on Isolotto San Paolo.

Diga della Tarantola Light consists of three lights, vertically disposed, shown on the head of the breakwater. The lower light is visible on the range for Passagio Piccolo (sec. 2C-42); the middle light indicates the axis of the passage between Isolotto San Paolo and Diga di San Vito; the upper light is visible between 025° and 055°.

CAPO SAN VITO RADIOBEACON (40° 25' N., 17° 12' E.) transmits from the lighthouse.

A Signal Station stands close westward of Capo San Vito Lighthouse. The station conducts correspondence at all hours.

2C-39 ANCHORAGES.—Mar Grande is a spacious anchorage and accommodates vessels of any size.

The anchorage for merchant vessels lies in the area bounded roughly by lines joining the following three positions; Isolotto San Niccolio, Castel San Angelo, and the head of the breakwater at Isolotto San Paolo, but not farther southward than 3/4 mile north-eastward of the latter. The area to eastward is reserved for naval vessels while that to westward is prohibited.

PROHIBITED AREAS.—Anchoring and navigation are prohibited southeastward of a line joining two positions each 500 yards northwestward, respectively, of the heads of Diga di San Vito and Diga della Tarantola; another area extends about 1 1/4 miles southward of Isolotto San Pietro and southwestward of Isolotto San Paolo. Underwater obstructions are placed within these areas from time to time. Such obstructions are marked by buoys of different shapes and constitute navigational hazards.

An area with an approximate radius of about 1 mile and having Capo San Vito Light as its center, lies southward of Diga di San Vito. The area westward of the merchant vessel anchorage is also a prohibited anchorage.

MOORING BUOYS.—There are numerous mooring buoys in Mar Grande, some of which have telephone connections.

HARBORS—PORTO MERCANTILE

2C-40 PORTO MERCANTILE, situated at the northern side of Mar Grande and west-

ward of Taranto Vecchio, is entered between two moles through a passage about 492 feet wide. The eastern mole extends about 200 yards southwestward from the western edge of Taranto Vecchio and is quayed for berthing ships. The western mole, also quayed, is broader and extends about 415 yards south-southeastward from a position about 1/4 mile westward of the western edge of the city.

Porto Mercantile is joined at the north-eastern side of the basin to Mar Piccolo by a narrow straight which is crossed by Ponte di Porta Napoli. The bridge has three arches permitting passage of boats.

Lights.—A light is shown from the head of each mole. Two lights are shown, one on each corner, from the head of a pier lying about 1/4 mile west-southwestward of the head of the western mole of Porto Mercantile.

BUOYS.—Several mooring buoys are located in Porto Mercantile.

The area between the western mole of Porto Mercantile and Punta Rondinella is being reclaimed, and construction was taking place (1966) consisting of an oil terminal area, pipeline berths, piers, increased depths, marker buoys, and mooring buoys. The oil pier with its root about 1/2 mile eastward of Punta Rondinella and extending south-southeastward has been completed. This area when completed will be designated as Porto Industriale.

HARBORS—PASSAGIO PICCOLO

2C-41 PASSAGIO PICCOLO (Canale Navigabile) is a quayed artificial canal dividing Taranto Nuovo and Taranto Vecchio and provides the navigable entrance into Mar Piccolo from Mar Grande. The canal is 410 yards long, 80 yards wide between the sides, and 63 yards wide between the abutments of a two-leaf swing bridge, with 39 feet clearance above mean sea level. It has a depth of 12m (39 ft.).

Canal traffic is regulated exclusively by Italian naval authorities and is limited to

merchant vessels carrying government cargo and naval vessels. The speed of transit for moderate size vessels is limited to 6 knots, which is considered also the most desirable maneuvering speed. Large vessels exceeding 500 feet in length are permitted a speed of 10 knots provided, however, propeller speed is reduced in the canal. Passage is found difficult for a vessel 770 feet length, 107 feet beam, and 29 feet draft.

Castel San Angelo, on the western side of the southern entrance, is the SIGNAL CONTROL STATION. After a request for transit has been submitted sufficiently in advance, ordinarily 6 hours, a vessel should display the hoist JFR about 30 minutes in advance of intended entry, which signal will be repeated from Castel San Angelo to indicate the granting of permission to enter. Detailed regulations of the canal should be obtained from the port authorities.

2C-42 LIGHTS—RANGES.—Diga della Tarantola Light (sec. 2C-38), in range, bearing 193°-013°, with a light shown from a quadrangular masonry tower situated on the beach 800 yards eastward of the root of Diga di San Vito, constitutes the southern range to Passagio Piccolo.

The rear northern range light is shown from a quadrangular masonry tower situated on the shore of the western bay of Mar Piccolo, 1 1/2 miles north-northeastward of Castel San Angelo. The front part of the range, consisting of 2 lights vertically disposed, is shown from a pyramidal framework beacon standing on piles about 1/2 mile southward of the rear light structure. The rear lights of both ranges are shown only during passage of a vessel through the canal.

Four fixed red lights mark the western side of Passagio Piccolo, one on each of the two heads of the quay and one on each of the two corners of the bridge abutment. On the eastern side are four fixed green lights, one on each of the two heads of the quay and one on each of the two corners of the bridge abutment.

2C-43 CURRENT.—The current in the canal is irregular in strength and direc-

tion, and transverse currents are experienced frequently at the entrance. Current SIGNALS are displayed from Castel San Angelo.

HARBORS—MAR PICCOLO

2C-44 MAR PICCOLO is divided into two bays by a peninsula projecting about 1 1/4 miles from the northern shore and which terminates in Punta Penna, a low narrow point. Between this point and the southern shore is a passage about 450 yards wide, the navigable width of which is reduced by shoals on each side to about 125 yards. Shoals of varying width border the entire shore of Mar Piccolo.

WESTERN BAY.—The area westward of the range through Passagio Piccolo is reserved for merchant vessels. Pontile del Genio Marina, a masonry pier with railway tracks, extends about 750 feet from the shore northward of Borgo della Stazione (sec. 2C-48). It has a depth of about 8m (26 ft.) at its head.

The southern shore eastward of the northern entrance to Passagio Piccolo is partially quayed, has three offshore wooded wharves and two principal moles, and contains the facilities of the naval establishment.

Close northward of Punta Penna on its western side is a concrete T-headed pier about 220 yards long that has a depth of 8.9m (29 1/2 ft.) at its head.

At the head of the bay there is a pier at the Tozzi Shipyard that has a depth of 8.3m (27 ft.) for about 480 feet of its eastern side.

Numerous **MOORING BUOYS** are located in the western bay.

EASTERN BAY.—There are several shallow water piers, numerous lighter and seaplane mooring buoys, and a torpedo launching pier and range.

On the southern shore, about 2 miles eastward of Punta Penna, is a 600-yard concrete pier with a depth of about 5.3m (17 ft.) at its head.

In both bays of Mar Piccolo are numerous staked fishing areas, the positions of which require chart examination.

2C-45 Navigational aids.—The range lights for Passagio Piccolo are described in section 2C-42.

The passage southward of Punta Penna is marked by two light buoys, the northern one shows a red fixed light, and the southern a fixed green light. A black can buoy is moored about 300 yards westward of the latter light buoy.

A pile beacon stands close southward of Punta Penna.

A light buoy is moored about $\frac{1}{2}$ mile east-northeastward of Punta Penna and marks the edge of a shallow spit extending southward from the western shore of the eastern bay. Another light buoy is moored about 100 yards eastward of the head of the pier, marked by two lights, vertically disposed, and located about $\frac{1}{2}$ mile northeastward of Punta Penna.

Several torpedo rafts and a searchlight float are moored in the eastern bay.

Lights are shown from the heads of Tozzi Shipyard pier, Molo di Ponente, Molo Nord, a small pier 550 yards westward of Molo Nord and two small piers 1 mile north-northwestward of Molo Nord.

PILOTAGE

2C-46 Pilotage is compulsory for merchant vessels of over 400 gross tons entering or leaving Mar Grande and for all vessels authorized to enter or leave Mar Piccolo. Merchant vessels wishing to enter Mar Piccolo must request a pilot from the port captain. Pilots will meet inbound vessels about 1 mile from Capo San Vito Light and will disembark from outbound vessels outside the entrance to Mar Grande.

DIRECTIONS FOR ENTERING

2C-47 A vessel approaching Taranto from southeastward should not close Capo San Vito nearer than 1 mile. From a position with Capo San Vito bearing 090°, steer for Isolotto San Paolo until on the axis of the entrance, and then steer into Mar Grande

midway between the heads of Diga di San Paolo and Diga di San Vito.

Coming from the westward or northwestward, a vessel should pass the southern coast of Isolotto San Pietro no closer than $1\frac{1}{2}$ miles and, when the lighthouse on the head of Diga di San Paolo bears north-northeast, the course should be shaped through the entrance as previously described. In approaching from this direction, vessels should avoid the torpedo range described in section 2C-12.

All vessels entering or leaving Mar Grande or in Mar Grande are required to answer all signals and questions originated by the signal station on Castel San Angelo.

If bound for Porto Mercantile or Porto Industriale vessels are required, whenabeam of Isolotto San Paolo, to steer for a position about 875 yards north-northwestward of the head of Diga della Tarantola, thence directly to the entrance of the port.

FACILITIES

2C-48 Taranto, one of the four major Italian naval bases, is the southern anchorage for the fleet. The city is built on a rocky tongue of land which separates Mar Piccolo to northeastward and Mar Grande to southwestward, and is composed of three parts: Taranto Nuovo, the easternmost, has large buildings and wide streets; Taranto Vecchio to westward has its houses built close together on an island served by two bridges; and Borgo della Stazione to northwestward and is of modern construction. The city had a population of about 200,000 in 1962 and is one of the cleanest cities in the Mediterranean.

The naval base constitutes the principal support of the city but other industries include manufacture of cement and linen and cotton fabrics, shell fish culture, and fishing.

It is a first port of entry.

Berths.—There are about 30 mooring buoys in Mar Grande.

Mar Piccolo has 17 alongside berths and 18 of the Mediterranean mooring type. There are also two coaling berths.

The western mole of Porto Mercantile has 1,100 feet of berthing space, and an additional 490 feet provided by a northeastern extension. The eastern mole has about 300 feet of berthing space. Alongside depths of 12 to 25 feet exist alongside the southeastern quay, and depths of 19 to 30 feet exist alongside the southwestern quay.

The quays in Porto Mercantile are served by railway tracks.

There are about five tugs and numerous lighters. Repairs.—Ship repairs of practically any nature can be made by arrangement with the naval ship-

yard. There are two dry docks and several floating ones. The dimensions of the larger dry dock are: length of bottom, 784 feet; width at bottom, 115 feet; depth on blocks, 36 feet. There is a floating crane of 150 tons capacity at 52 feet radius and 45 tons at 72 feet.

Supplies.—Provisions of all kinds are available.

Potable and boiler water of good quality is available from connections at the berths in Porto Mercantile and from water barges. The supply is plentiful normally but becomes scarce with lack of rain. Fuel oil is supplied by barge.

Communications.—Telephone, telegraph, cable, and radio facilities are available on 24-hour service.

The city is on the main coastal railway line and there are several daily trains to all major Italian cities.

There is no regular steamship service to the port but some vessels in the Italian and Mediterranean service use it as a port of call.

Radio navigational warnings are broadcast from Taranto.

Hospitals.—There is a 500-bed naval hospital and a 200-bed civilian hospital. Pratique may be granted day or night. All types of sanitation operations may be performed.

ANCHORAGES

2C-49 Anchorage may be taken practically anywhere off the coast of Golfo di Taranto where depths permit. Good holding ground prevails nearly everywhere. The following anchorages are recommended:

Ciro Marina.—See section 2C-8.

Madonna di Mare.—See section 2C-8.

San Angelo di Rossano.—See section 2C-9.

Marina di Rocca Imperiale.—See section 2C-11.

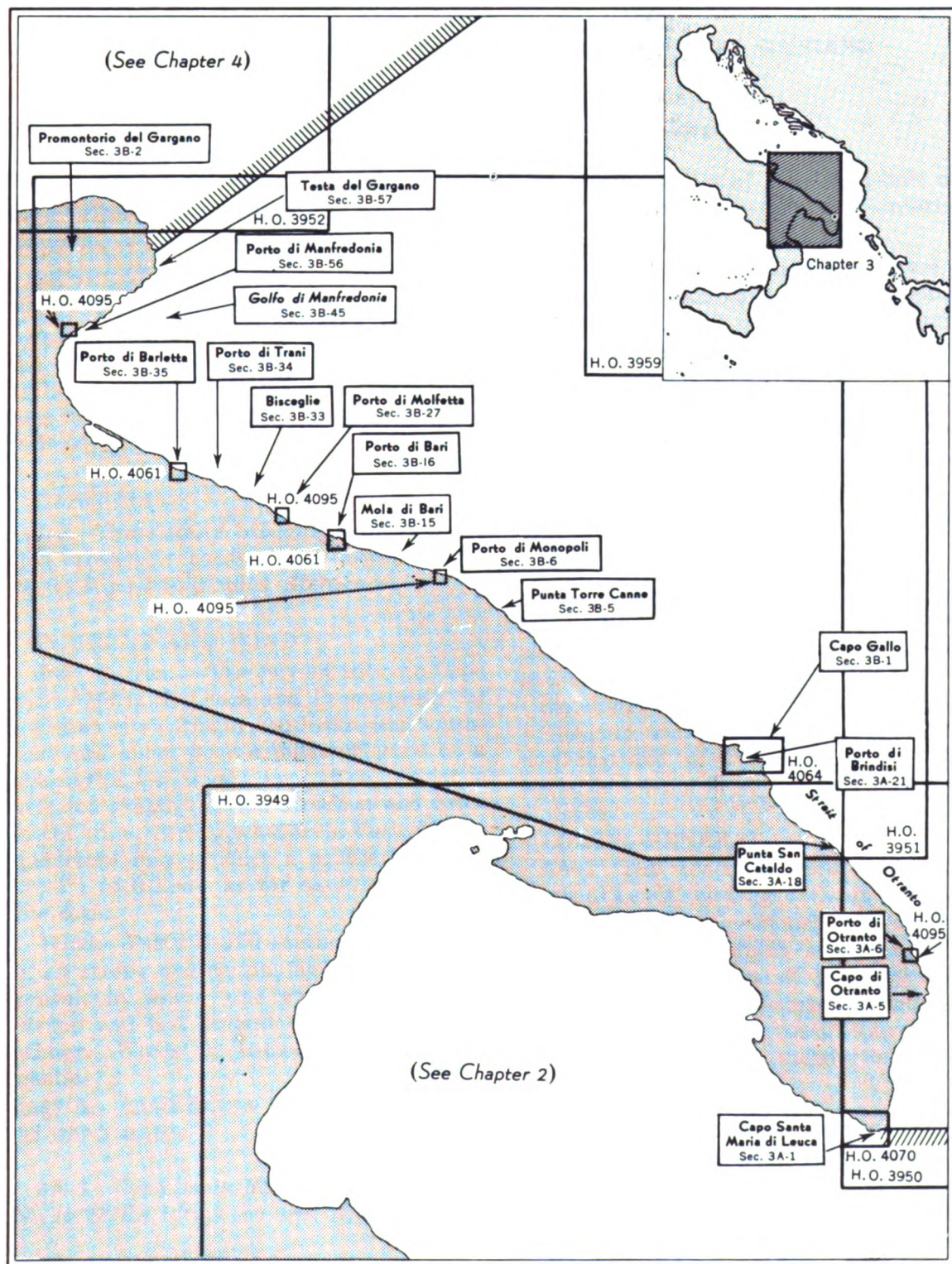
Leuca.—See section 2C-13.

Porto di Gallipoli.—See section 2C-22.

Porto Cesarea.—See section 2C-26.

Insenatura Santa Maria del Bagno.—See section 2C-26.

Porto di Taranto.—See section 2C-39.



CHAPTER 3—GRAPHIC INDEX

CHAPTER 3

EASTERN COAST OF ITALY FROM CAPO SANTA MARIA DI LEUCA TO PROMONTORIO DEL GARGANO

Part A. Capo Santa Maria di Leuca to Capo Gallo.

Part B. Capo Gallo to Promontorio del Gargano.

Plan.—The coast in this chapter, comprising the southern part of Italy's Adriatic coast, is described in sequence from Capo Santa Maria di Leuca northward to Promontorio del Gargano, as far as Scoglio Santa Croce, off Vieste.

GENERAL REMARKS

3-1 The coast described in this chapter forms the northeastern side of the heel of the so-called boot of Italy. The important harbor of Brindisi and numerous smaller harbors together with Golfo di Manfredonia are included in this area.

DANGERS

3-2 There are no off-lying dangers along this stretch of coast; the 6-fathom curve varies from 1 to 3 miles offshore.

CURRENT AND WIND

3-3 **Current.**—The current between Capo Santa Maria di Leuca and Promontorio del Gargano sets normally southward and south-eastward about 3 or 4 miles offshore at a velocity of less than 1 knot. The current is affected greatly by the direction and force of the wind. Strong wind from the northern quadrants may produce a southerly set of from 1 to 3 knots as far as 40 miles from the coast.

Wind.—Easterly and southeasterly winds, often strong and continuing up to 10 days, prevail in winter and spring. Boras are strong and last several days, especially in winter. Winds in summer are generally gentle.

PART A. CAPO SANTA MARIA DI LEUCA TO CAPO GALLO

3A-1 Capo Santa Maria di Leuca ($39^{\circ}48'$ N., $18^{\circ}22'$ E.) forms the heel of the so-called

Italian boot. It is the eastern entrance point of Golfo di Taranto and the western entrance point of the Strait of Otranto, the entrance to the Adriatic. The cape is about 459 feet high and appears rocky and precipitous from southward, but from other directions it presents a more gradually sloping appearance.

A light is shown near the southern extremity of the cape.

A radiobeacon transmits from the light-house.

Signal Station.—A conspicuous signal station, consisting of a black and white checkered tower with arched windows, stands about $1\frac{1}{2}$ miles northwestward of the light-house.

Storm signals are shown (sec. 1-11).

The old signal station, about $1\frac{1}{2}$ miles northeastward of the light on Capo Santa Maria de Leuca, is visible only from a short distance.

COAST—GENERAL

3A-2 The coast between Capo Santa Maria di Leuca and Capo di Otranto, 20 miles north-northeastward, consists of a cultivated rocky plateau, on which numerous villages are located. From Capo di Otranto the coast, which is low and indented with numerous coves, trends northwestward about 45 miles to Capo Gallo and the vicinity of Brindisi.

DANGERS

3A-3 As far as Capo di Otranto the coast is bold, there being deep water close-to and

no off-lying dangers. Northward of Capo di Otranto, the water is deep beyond 1 mile offshore, except in the vicinity and south-eastward of Capo Gallo where shoals extend about 2 miles seaward.

NAVIGATION

3A-4 Along coast.—From a position 4 miles southeastward of Capo Santa Maria di Leuca Lighthouse, a course of 016° for 23 miles leads to a position 2 miles eastward of Capo di Otranto Lighthouse. From the latter position, a course of 351° for about 9 miles leads 4 miles eastward of Torre San Andrea, from whence a course of 321° for 38 miles leads clear of dangers, including those off Brindisi, to a position 5 miles north-eastward of Capo Gallo Lighthouse.

To ports in the Adriatic.—See descriptions of ports.

LANDMARKS—COASTAL FEATURES

3A-5 From Capo Santa Maria di Leuca the coast trends $8\frac{1}{2}$ miles northward to Porto di Tricase where a small inlet protected by a breakwater forms a small craft harbor. There are a few buildings and an arched white stone viaduct at the port. The campanile and dwellings of Gagliano del Capo situated at a height of 472 feet, 3 miles northward of the cape, can be seen conspicuously above the headland from a few miles offshore. A light is shown from Porto di Tricase.

Porto di Castro is formed between the coast and Punta Mocarone, a high rocky point about 4 miles north-northeastward of Porto di Tricase. The village of Castro stands on a hill, 325 feet high, close northward of the point. A conspicuous castle in the village is a good landmark.

Anchorage is available in about 13.8m (7 $\frac{1}{2}$ fm), mud, about 760 yards southwestward of Punta Mocarone. The harbor is shallow and is suitable for small boats only. It is impossible to enter the harbor with strong easterly winds, which are dominant in winter and spring.

From Porto di Castro the coast, which is high and indented by fissures and coves; extends 2 miles north-northeastward to the

small harbor of Porto Miggiano. A tower stands about $\frac{1}{2}$ mile northward of Porto Miggiano.

Terme di Santa Cesarea, a spa containing prominent ornamental buildings, is situated on a high rocky coast about 1 mile eastward of Porto Miggiano. The shore southward of Terme di Santa Cesarea is marked by stone quarries.

Porto Badisco, a narrow deep inlet with high and rocky sides, is located about $2\frac{1}{2}$ miles southwestward of Capo di Otranto. Boats should not remain there with strong easterly winds. A gray building and a red house stand to the westward of the entrance, and on the same side, on the highlands, is a low rectangular building with two arcades overlooking the sea.

Capo di Otranto ($40^\circ 06' N.$, $18^\circ 31' E.$), 5 miles north-northeastward of the spa and about 20 miles north-northeastward of Capo Santa Maria di Leuca, is the eastern side of a high precipitous tableland. Viewed from northward and southward the cape appears to descend at a 45° angle. Deep water lies close off the point.

A light is shown from the northeastern point of the cape.

A disused signal station stands about 500 yards northwestward of the light; storm signals are displayed.

Punta Posta delle Fasci lies about $1\frac{1}{2}$ miles northward of Capo di Otranto. It is low, rocky, and flat but easily recognized. Punta dell'Orto lies 500 yards north-northwestward and is overlooked by a quadrangular tower surrounded by a few houses. Torre Serpente, about 600 yards farther north-westward, is a slender pile of masonry ruins standing on a hill and is readily visible northward for a great distance.

The description of the coast northwestward of Porto di Otranto is continued in section 3A-18.

PORTO DI OTRANTO

Position: 40°09' N., 18°30' E.

Depths:

Anchorage, 11 fathoms.

Quays, 15 to 22 feet.

Port plan: Section 3A-17.

3A-6 Porto di Otranto lies in a bay located between Punta San Nicola, 2½ miles northwestward of Capo di Otranto, and Punta Craul, about 1 mile farther northwestward. A mole extends northwestward from Punta San Nicola, enclosing the southeastern part of the bay. The town of Otranto is situated on the southwestern side of the bay.

Vessels up to 230 feet long with a maximum draft of 19½ feet can enter the port.

3A-7 Navigation—Northbound.—From a position on the coastal track 2 miles eastward of Capo di Otranto Lighthouse, a course of 329° for 3 miles leads to a position about 1.5 miles eastward of the harbor entrance.

Southbound.—From a position on the coastal track 4 miles eastward of Torre San Andrea, a course of 188° for 5 miles leads to a position 1.5 miles northeastward of the harbor entrance.

Winds and Weather.—The harbor is protected from all winds except those from northward. The bora, especially in winter, is violent and usually lasts for a few days. The Albanian mountains enveloped by clouds indicate northerly winds; if they are clear they indicate the scirocco.

3A-8 Current.—The current follows the coast southward generally, even with southeasterly wind. This is particularly true off Otranto where the current in summer sometimes attains a velocity of 1.5 knots.

3A-9 Depths.—There is 12 fathoms of water in the usual anchorage for ocean-going vessels, and the depth in the approach is well in excess of that. The depths alongside the breakwater quay are 22 feet, or greater.

3A-10 Landmarks.—In clear weather a vessel approaching from northward will sight the tall slender campanile of the cathedral in Lecce, about 19 miles northwestward of Otranto and 6 miles inland. To a vessel approaching from southward the high

land of Capo di Otranto and its lighthouse and signal station will be identified readily. The town of Otranto is built on a relatively high yellowish rock stratum. Conspicuous in the town are the castle at the southeastern part, and the dark thick-set campanile of the cathedral.

3A-11 Anchorage.—The anchorage recommended for ocean-going vessels is in 12 fathoms with the campanile of the cathedral bearing 217° and Torre Serpente bearing 150°. Mariners are cautioned that the bottom is poor holding ground and they should be prepared to depart if heavy weather makes up. Smaller vessels can obtain good holding ground in about 4½ fathoms on the line joining Punta Craul and the campanile, in a position about 300 yards from the latter.

Anchorage is prohibited in the vicinity of Punta Craul. The prohibited area extends about 6 miles seaward in an east-northeasterly direction; the width of the area is about ¼ mile at the shore end and 1½ miles at the seaward end.

3A-12 Dangers.—Secca La Scala with a least depth of 31 feet lies about 1/2 mile northeastward of Punta Craul. The sea breaks on this shoal during strong winds. Two detached shoals, with depths of 37 and 47 feet, lie about 200 yards southwestward and 600 yards southeastward, respectively, of Secca La Scala. A 17-foot patch lies about 1/4 mile northward of Punta Craul.

A wreck lies about 1¼ miles east-northeastward of Punta Craul.

Secca delle Casse fronts the mole and extends east-southeastward to Punta San Nicola, and west-northwestward in line with the mole for about 55 yards. A conical buoy surmounted by a red sphere is moored at the northwestern edge of this shoal.

Depths of less than 5 fathoms extend northward and north-northeastward from Punta Craul for a distance of nearly ½ mile.

A shoal with depths of less than 5½ fathoms lies nearly 300 yards northeastward of the head of the breakwater.

3A-13 Navigational aids.—A light is shown from a white lamppost on a pedestal, 30 feet high, on Punta Craul.

A light is shown also from a post near the end of the mole.

Two range beacons, each consisting of a white masonry tower surmounted by a vane, are situated on the eastern shore of the inner harbor. These beacons in range, 125° – 305° , lead through the narrow channel southward of the molehead.

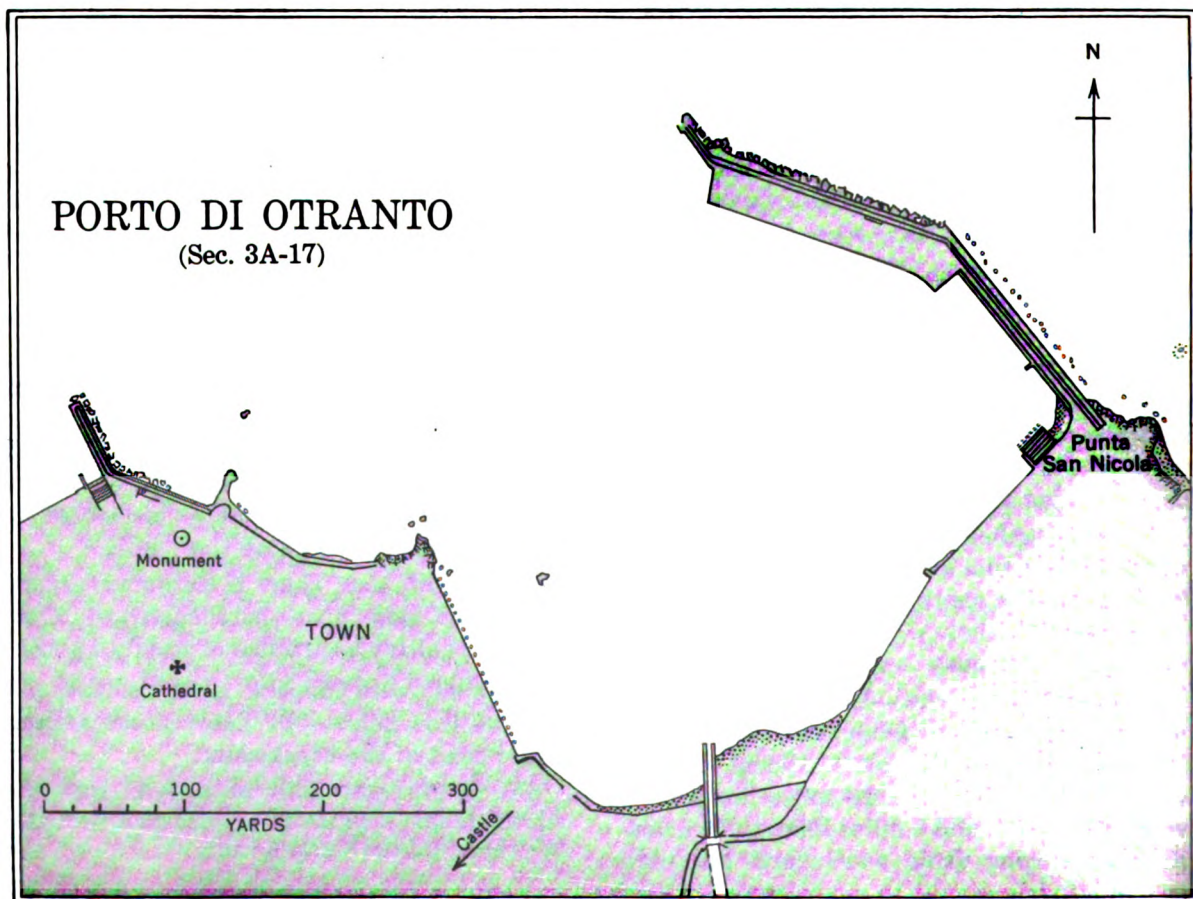
A buoy moored about 150 yards southwestward of the breakwater head marks the northern extremity of the shallow water in the southeastern part of the harbor.

3A-14 Harbor.—The eastern part of the inner harbor, about 400 yards in diameter, lies southward of the mole, which extends about 360 yards from Punta San Nicola, in a general northwesterly direction. The outer half of the mole is quayed. The outer 180 feet is fronted by shallow water for a distance of about 60 feet. Southeastward of this section the mole widens to 82 feet for a

distance of 310 feet. There is a narrow channel between the mole and the shallow water which occupies the entire southwestern part of the harbor. The channel is dredged to a depth of 23 feet. The eastern part of the harbor is dredged to a depth of 20 feet for a width of about 100 feet from the quayed shore.

3A-15 Pilots are available locally.

3A-16 Directions for entering.—A vessel approaching the anchorage should not permit the campanile of the cathedral to bear less than 217° , in order to clear Secca La Scala safely, or allow Punta Craul to bear greater than 282° , to avoid the dangers northward of Punta San Nicola. A vessel intending to enter the inner harbor from the anchorage should close the northwestern shore as closely as possible to allow sufficient room to line up on the range. A vessel should pass westward and southward of the buoy moored off the mole head.



3A-17 FACILITIES.—Otranto, population about 2,500, has a small import and export trade. The berth at the widened part of the mole is 310 feet long with a depth of 22 feet alongside. Fresh provisions in small quantity can be procured. There is a railway station, and bus, telegraph, and telephone service.

LANDMARKS—COASTAL FEATURES (Continued)

3A-18 The coast northward of Otranto contains numerous coves, and for the most part is bordered by an inshore reef. *Baia di Alimini* opens $8\frac{1}{2}$ miles northward of Punta Craul at the head of which is an inlet into a lagoon. A conspicuous masonry bridge with seven arches crosses the inlet. Northward of the inlet the coast consists of a sandy beach backed by groups of irregular sand dunes sparsely covered with bushes.

Secca Missipezza is a rocky steep-to reef extending $\frac{1}{2}$ mile offshore $4\frac{3}{4}$ miles northward of Punta Craul. It is advisable to always pass eastward of the shoal.

Torre San Andrea ($40^{\circ}15' N.$, $18^{\circ}27' E.$) stands on a coastal elevation $6\frac{1}{2}$ miles north-northwestward of Punta Craul, and close to it is a white building and a large farm house.

A light is shown from *Torre San Andrea* from a black-and-white checkered square tower standing close to the coast.

A light is shown from the head of the outer mole at *Torre Santa Foca*, about $3\frac{1}{4}$ miles northwestward of *Torre San Andrea*.

Punta San Cataldo di Lecce, 10 $\frac{1}{2}$ miles northwest of *Torre San Andrea*, is low and sandy. A light is shown on the point; a radio-beacon transmits from the light structure. On the beach westward of the point there is a conspicuous white bathing pavilion. A rocky ledge with depths of 3 to 13 feet extends 500 yards eastward from the point.

A prohibited anchoring and fishing area extends about 5 miles offshore from *Punta San Cataldo di Lecce* to a position $6\frac{1}{2}$ miles northwestward.

Borgo Piave Radio Direction-finder Station ($40^{\circ}24.6' N.$, $18^{\circ}13.7' E.$) is situated about $3\frac{3}{4}$ miles west-northwestward of *Punta San Cataldo*.

The coast from *Punta San Cataldo* to *Capo Cavallo*, 20 miles northwestward, is low and generally rocky, contains few dwellings, but has numerous towers.

A coast guard station is located near *Torre Specchiolla*, situated about $11\frac{1}{4}$ miles northwestward of *Punta San Cataldo*.

The campanile of *Squinzano*, $7\frac{1}{2}$ miles northwestward of *Lecce* (sec. 3A-10), is secondary only to that of the latter in use as a landmark by mariners. The pointed campanile is dark-colored and rises above inconspicuous houses on the summit of a flat-topped little hill about 5 miles inland.

Torre Mattarella ($40^{\circ}35' N.$, $18^{\circ}03' E.$), about 17 miles northwestward of *Punta San Cataldo*, is a brown rectangular tower. A white masonry building, 49 feet high, stands close westward of the tower.

3A-19 Capo Cavallo.—*Punta della Contessa* lies about 1 mile northward of *Torre Mattarella*, and nearly 8 miles farther north-northwestward, *Capo Cavallo* extends eastward for almost $\frac{1}{2}$ mile. Between these two points the shore bank with depths of less than 5 fathoms extends offshore for about 1 mile.

Secche di Capo Cavallo is a rocky foul area, with depths from 1 to 5 fathoms and with many awash and sunken rocks, extending $\frac{3}{4}$ mile eastward and nearly 1 mile northward from *Capo Cavallo*. On the extremity of the cape is a conspicuous trellis. Several wrecks lie about $1\frac{3}{4}$ miles northeastward and northward of *Capo Cavallo*.

Buoys.—A buoy is moored about $1\frac{1}{4}$ miles southeastward of *Capo Cavallo*. A light buoy is moored $1\frac{1}{2}$ miles north-northeastward of *Capo Cavallo* in about 8 fathoms of water. The buoy marks deep water northeastward of *Secche di Capo Cavallo* and is used as an approach buoy by vessels bound for *Porto di Brindisi* from eastward and southward.

ANCHORAGES

3A-20 Anchorages may be taken anywhere along the coast where depths permit. The location of recommended anchorages follow:

Porto di Castro.—In $7\frac{1}{2}$ fathoms over mud about 750 yards southwestward of *Punta Mocarone* (sec. 3A-5).

Punta Postal delle Fasci.—In 8 fathoms over mud about $\frac{1}{2}$ mile southward of the point (sec. 3A-5).

Porto di Otranto.—Section 3A-11.

Baia di Alimini.—In $7\frac{1}{2}$ fathoms north-eastward of a white house on the beach and $\frac{1}{2}$ mile offshore (sec. 3A-18).

Cala dell'Orso.—For small vessels in $5\frac{1}{4}$ fathoms over good holding ground with Torre dell'Orso, $1\frac{1}{2}$ miles north-northwestward of Torre San Andrea, bearing 270° and at least 220 yards offshore (sec. 3A-18).

Punta San Cataldo di Lecce.—In $7\frac{1}{2}$ fathoms over sand about 1 mile east-southeastward of the lighthouse (sec. 3A-18).

Porto di Brindisi.—Section 3A-30.

PORTO DI BRINDISI

Position: $40^\circ 39' N.$, $17^\circ 59' E.$

Depths:

Avamporto, $5\frac{1}{2}$ to 9 fathoms.

Porto Esterno, 5 to 6 fathoms.

Canale Pigonati, 31 feet.

Porto Interno, 26 to 39 feet.

Quays, $3\frac{1}{2}$ to 32 feet.

Tide: Mean range, 0.6 foot; spring range, 0.9 foot.

Port plans:

Plan A, Porto Esterno (sec. 3A-31).

Plan B, Porto Interno (sec. 3A-40).

3A-21 Porto di Brindisi has the best harbor on Italy's Adriatic coast. It lies between Capo Bianco, $1\frac{1}{4}$ miles west-northwestward of Capo Cavallo, and Punta Riso, $1\frac{1}{2}$ miles northwestward. Capo Gallo is situated about 2 miles farther northwestward. The shore between Capo Gallo and the port is irregular, consisting of low dark rocks. Vessels up to 656 feet long with a maximum draft of $32\frac{1}{2}$ feet can enter the port. There are also extensive naval installations.

The port has three parts: Avamporto is the outer roadstead; Porto Esterno is the breakwater-protected outer harbor; and Porto Interno is the inner harbor, which consists of two basins entered from Porto Esterno through Canale Pigonati.

NAVIGATION

3A-22 Northbound.—Vessels following the coastal track between Capo di Otranto and Capo Gallo pass about $2\frac{1}{2}$ miles eastward of the light buoy in the eastern approach to the port, from whence Directions for entering (sec. 3A-39), should be followed.

Southbound.—From a position on the coastal track with Capo Gallo Lighthouse bearing 206° , distant 5.5 miles, a course of 180° leads to the harbor entrance.

An aviation radiobeacon transmits from a position $3\frac{1}{2}$ miles westward of Brindisi.

WIND AND CURRENT

3A-23 Wind.—Southeasterly and northeasterly winds predominate at Brindisi, but northwesterly wind is not infrequent.

The harbor is sheltered from all winds except those from northeastward and from eastward, which cause some disturbance at Banchina Centrale and Banchina della Dogana.

When the winds from west and northwest begin to veer to the north, it is almost certain that there will be bora weather. Sometimes, in winter, after about 1 hour of the libeccio winds, a strong bora follows. If the bora turns to the north it will probably decrease; if, instead, it turns to the east, almost always the contrary will happen.

Current.—Outside the harbor the current sets southeastward along the coast, its velocity increasing with northerly wind. These currents are dangerous because they set toward the land; they have caused many shipwrecks in periods of low visibility. Before strong northwesterly wind this current enters the harbor, sometimes attaining a velocity of 3 knots at the entrance to Porto Esterno and in Canale Pigonati.

DEPTHS

3A-24 The Avamporto has depths of $5\frac{1}{2}$ to 9 fathoms except over the bordering shoals in the southeastern part of the roadstead, and depths greater than 20 fathoms exist in the approach. The frequented portion of Porto Esterno has 5 to 6 fathoms of water. There is a depth of $32\frac{1}{2}$ feet in the fairway of Canale Pigonati. The greater portion of Porto Interno has depths of 26 to 39 feet.

Caution.—Siltng has always occurred in this port, and depths described herein may not exist at all times.

LANDMARKS

3A-25 The land in the vicinity of Porto di Brindisi is low and sometimes difficult to identify. The campanile of Lecce (sec. 3A-10) is the only distinguishable object from a distance eastward of southeastward. A conspicuous chimney stands about $\frac{3}{4}$ mile westward of Capo Cavallo. A conspicuous flare was reported (1964) to exist about $\frac{1}{2}$ mile westward of the cape. A chimney northward

of Punta San Cataldo di Lecce (sec. 3A-18) may be sighted from closer inshore. From northward or northwestward, Torre Penna is the first object sighted on this low coast, which otherwise is not visible beyond a distance of 7 miles. Torre Penna is a large square tower situated on the extremity of Capo Gallo (Punta Penna), a low tongue of land 2 miles northwestward of Punta Riso, the western entrance point of the harbor. (See sec. 3B-1).

In the vicinity of the harbor the most conspicuous objects are: the two light structures marking the entrance; Castello a Mare, a massive light gray-colored masonry structure situated northward of the entrance into Porto Esterno; the quadrangular campanile of the dark-colored church in the northern part of the city; and the tall isolated Sailors' Monument situated on the northeastern bank of Porto interno. The monument represents a rudder and when seen from a distance it has the shape of a bird.

APPROACHES

3A-26 Between Capo Cavallo and Porto di Brindisi the 6-fathom curve lies up to about 1 mile offshore. The foul rocky area within the 6-fathom curve is a westerly extension of the foul ground off Capo Cavallo (sec. 3A-19).

The coast between Capo Gallo, northward of the port, and Isola San Andrea is rocky, but fairly steep-to, the 6-fathom curve lying nearly $\frac{1}{2}$ mile offshore. Except for Secca San Andrea, a 7.3m (4 fm) patch about 650 yards north-northwestward of Isola San Andrea, no dangers lie outside the 6-fathom curve. A wreck lies about 2 miles east-northeastward of Capo Gallo. Another wreck lies about $1\frac{3}{4}$ miles northeastward of Pedagne light. A white conical buoy is moored about $\frac{1}{4}$ mile north-northeastward of Punta Riso.

A charted prohibited anchorage area extends up to 4 miles northeastward from the port and includes a large part of Avamporto.

HARBOR—AVAMPORTO

3A-27 The Avamporto, or roadstead, consists of a bay about 1 mile in diameter. The eastern side of the bay is bounded by Le Pedagne, a group of islands extending over $\frac{1}{2}$ mile in a west-northwest and east-southeast direction on a shallow reef. Padagne

Grande, the largest, is connected southwestward by a causeway $\frac{1}{4}$ mile long to Capo Bianco. A pier, 920 feet long with 7m (23 ft) to 8m (26 ft.) alongside, is about $\frac{1}{2}$ mile westward of Capo Bianco. A light is shown from the head of the pier. Isolotto Traversa is the westernmost islet and the eastern entrance point of the roadstead. A submerged pipeline extends about 460 yards southwestward from Isolotto Traversa. A buoy marks the outer end of this pipeline, with five mooring buoys nearby. Two beacons in range 143° and marking the alignment of the oil pipeline berth are about 425 yards west-southwestward of Capo Bianco. Tankers mooring to the buoys should let go their starboard anchor on the range line with Pedagne Light (sec. 3A-29) bearing 087° ; precision is essential in anchoring, as the position is in a prohibited anchorage. A signal station stands close northwestward of the front beacon. The western shore of the roadstead is formed by Isola San Andrea and Castello a Mare, two causeway-joined islands, about $\frac{1}{2}$ mile long lying on an extensive reef. Punta Riso, the western entrance point of the roadstead, is an islet lying 250 yards northeastward of Isola San Andrea. The northern extremity of the larger island is connected by a causeway to the mainland westward. The mainland forms the southern shore of the roadstead.

3A-28 Shoals.—Shallow water surrounds Le Pedagne and occupies the southeastern part of the roadstead. The 6-fathom curve runs southward from a position 200 yards northwestward of Isolotto Traversa to a position 800 yards northwestward of Capo Bianco, whence it closes the shore westward to about 300 yards northward of Punta Fiume Grande on the southern shore, $\frac{1}{2}$ mile eastward of the root of the southern breakwater. Depths of less than 11m (6 fm) lie 200 yards eastward of the breakwaters enclosing Porto Esterno. A depth of 12.5m (6 $\frac{3}{4}$ fm) is located about $\frac{1}{2}$ mile northeastward of Punta Riso.

Secca dell'Arco is an isolated reef with a depth of 5.2m (2 $\frac{3}{4}$ fm) about 600 yards northwestward of Punta Fiume Grande. The reef is marked on its southern side by a light buoy. An isolated rocky patch with a depth of 8.8m (4 $\frac{3}{4}$ fm) lies 700 yards north-northeastward of the same point. Depths of

9.8m (5 1/4 fm) lie up to 200 yards west-northwestward of the patch.

3A-29 Lights.—Pedagne Light is situated on Isolotto Traversa.

A light is shown on the roof of a pier at Punta Riso.

Castello a Mare Light is situated on the top of the southern end of Castello a Mare, located close southward of Isola San Andrea.

Signal Station.—A signal station and mast are located close to Castello a Mare Light structure. Storm warnings are displayed. (See sec. 1-11.)

3A-30 Anchorage.—The usual anchorage is in the eastern part of the Avamporto, which is open to northeasterly wind, but is protected from easterly wind by Le Pedagne and the causeway. When strong southeasterly winds blow, a long swell enters the anchorage, and for this reason, though the bottom is mud and good holding ground, the roadstead is used only as a temporary anchorage in good weather.

HARBOR—PORTO ESTERNO

3A-31 Porto Esterno (*Port plan A*), the outer harbor, roughly triangular in shape, lies westward of Isola San Andrea, Castello a Mare, and the breakwaters to the southward. The breakwater entrance is about 250 yards wide. Seno Bocche di Puglia, the northern part of the harbor, is enclosed on the north by the causeway connecting Isola San Andrea to the mainland and is completely sheltered. Several landing places and short piers skirt the northwestern shore of the harbor, and seaplane hangars are located just northward of Canale Pigonati, the channel leading from the southwestern part of the harbor into Porto Interno. A number of mooring buoys are in Porto Esterno. A compass adjustment buoy is in the center of Seno Bocche di Puglia.

3A-32 Shoals.—The western side of Porto Esterno is bordered by a reef about 200 yards wide with depths of less than 5.5m (3 fm). The northern part of the eastern side is similarly bordered but for a lesser width. A shoal of sand with patches of rock and weed, with a depth of 4.5m (2 1/2 fm) over

its western edge, extends about 100 yards from the northern breakwater.

Secca del Fico, with a depth of 3.7m (2 fm) and surrounded by an area having less than 5.6m (3 fm) of water, occupies the southern part of the harbor for a distance of about 600 yards westward of the southern breakwater. The northern side of the shoal area, which is steep-to, is marked by a red can light buoy.

3A-33 Lights.—The breakwater entrance is marked by a light shown on the head of the northern breakwater and also on the head of the southern breakwater.

A fog signal is sounded at the light on the northern breakwater.

3A-34 Anchorage.—Good anchorage is available, over mud, offshore of the bordering reefs. Sailing vessels and small craft usually anchor off the western shore south-eastward of Casa Finanza, situated 900 yards north-northeastward of the entrance to Canale Pigonati. Seno Bocche di Puglia is reserved for naval use and seaplane activities. In all cases vessels must not obstruct traffic through Canale Pigonati.

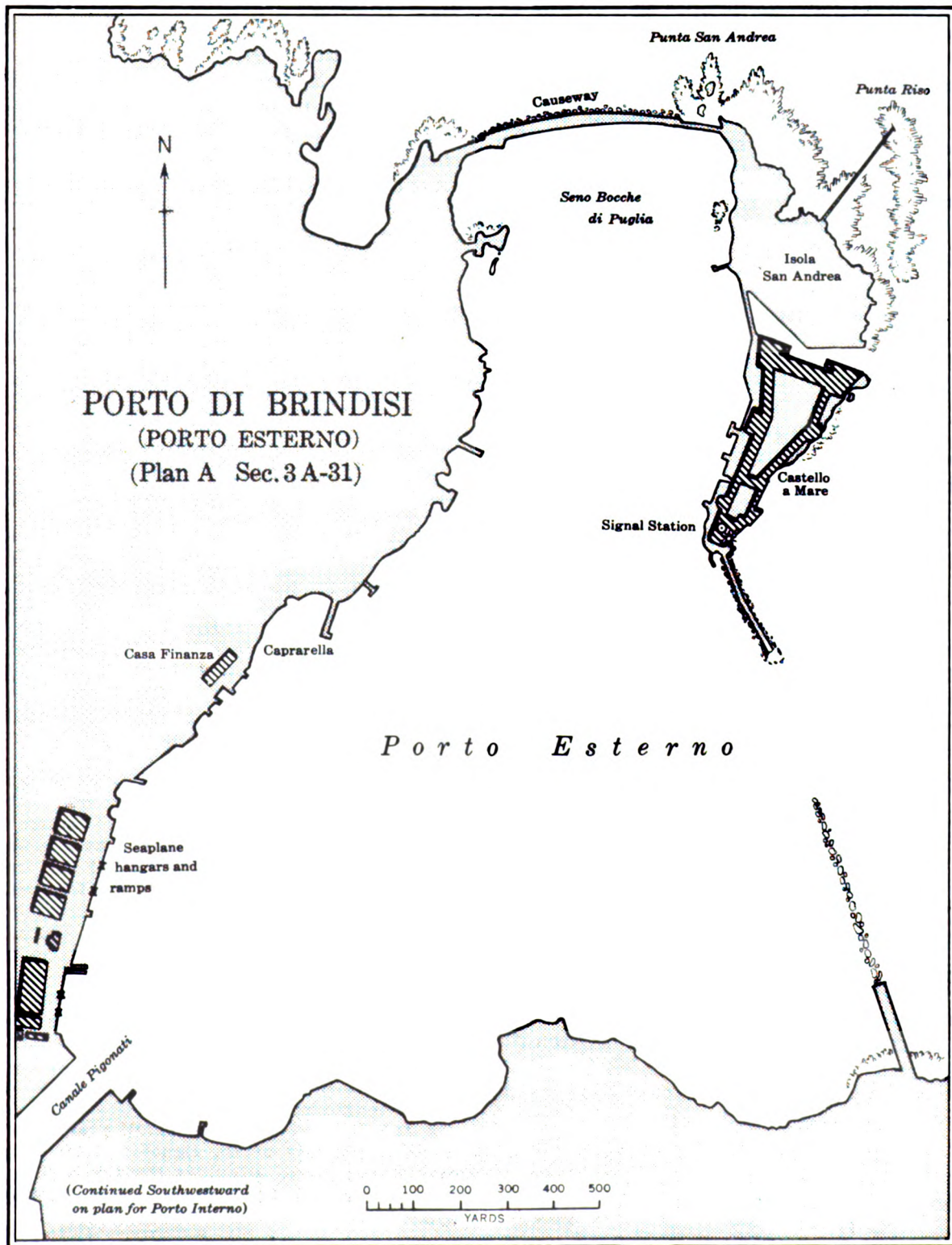
A number of mooring buoys are in the outer harbor.

An obstruction, consisting of metal plates, is located about 700 yards west-southwestward of the light on the northern breakwater.

HARBOR—PORTO INTERNO AND CANALE PIGONATI

3A-35 Porto Interno consists of two arms of a bay; a northern one extending about 1 mile in an east-west direction northward of the city; and an eastern one about 1/2 mile long lying eastward of the city. Porto Interno is entered from the southwestern part of Porto Esterno by Canale Pigonati, a quayed entrance about 300 yards long and 110 yards wide. A conspicuous white and slender marble column stands on the summit of a stairway near the entrance of the channel.

The northern and eastern sides of the city are quayed as is a section of the eastern arm immediately southward of Canale Pigonati. The western end of the northern arm



is reserved for naval use, its shores containing naval installations. An oil depot with several piers is located at the southern end of the eastern arm.

The greater portion of the shores of both arms is fronted by shoals containing some rocks, the extent and depths of which can be determined best by inspecting the chart.

A number of mooring buoys are in the inner harbor.

3A-36 Lights.—Both points at the northeastern entrance to Canale Pigonati are marked by a light. Both points on the southwestern entrance marked also by a light.

PILOTAGE

3A-37 Pilotage is compulsory for vessels exceeding 500 tons. Vessels are boarded by the pilot approximately in a position midway between Punta Riso and Le Pedagne Lighthouses.

GENERAL REGULATIONS

3A-38 A number of regulations are in effect relating to the movement of vessels, their berthing and anchoring, and to aircraft movement in Porto Esterno, Canale Pigonati, and Porto Interno. Pilots are acquainted with the existing regulations and a copy of them can be obtained from the harbor authorities.

DIRECTIONS FOR ENTERING

3A-39 As mentioned previously, the land in the vicinity of Porto di Brindisi is low and difficult to identify, especially during southerly winds, when a haze is prevalent. On nearing the port the character of the bottom is helpful in determining position; it being weedy off Capo Cavallo; hard mud off Capo Gallo; and rock, sand, or gravel between the two.

A vessel approaching from eastward or southward should head for Punto Riso Lighthouse on a bearing not greater than 252° from a position with Torre Mattavella (sec. 3A-18) bearing not less than 197° passing eastward and northward of the light buoy off Capo Cavallo. By observing these limit-

ing bearings the wreck and foul area (sec. 3A-19) off Capo Cavallo will be avoided. From a position about 1,150 yards 330° from Le Pedagne Lighthouse, a course of 180° leads to the anchorage in Avamporto.

A vessel approaching from northward should steer to pass between Punta Riso and Le Pedagne Lighthouse, favoring the Le Pedagne side of the entrance to avoid the shoals off Isola San Andrea.

FACILITIES

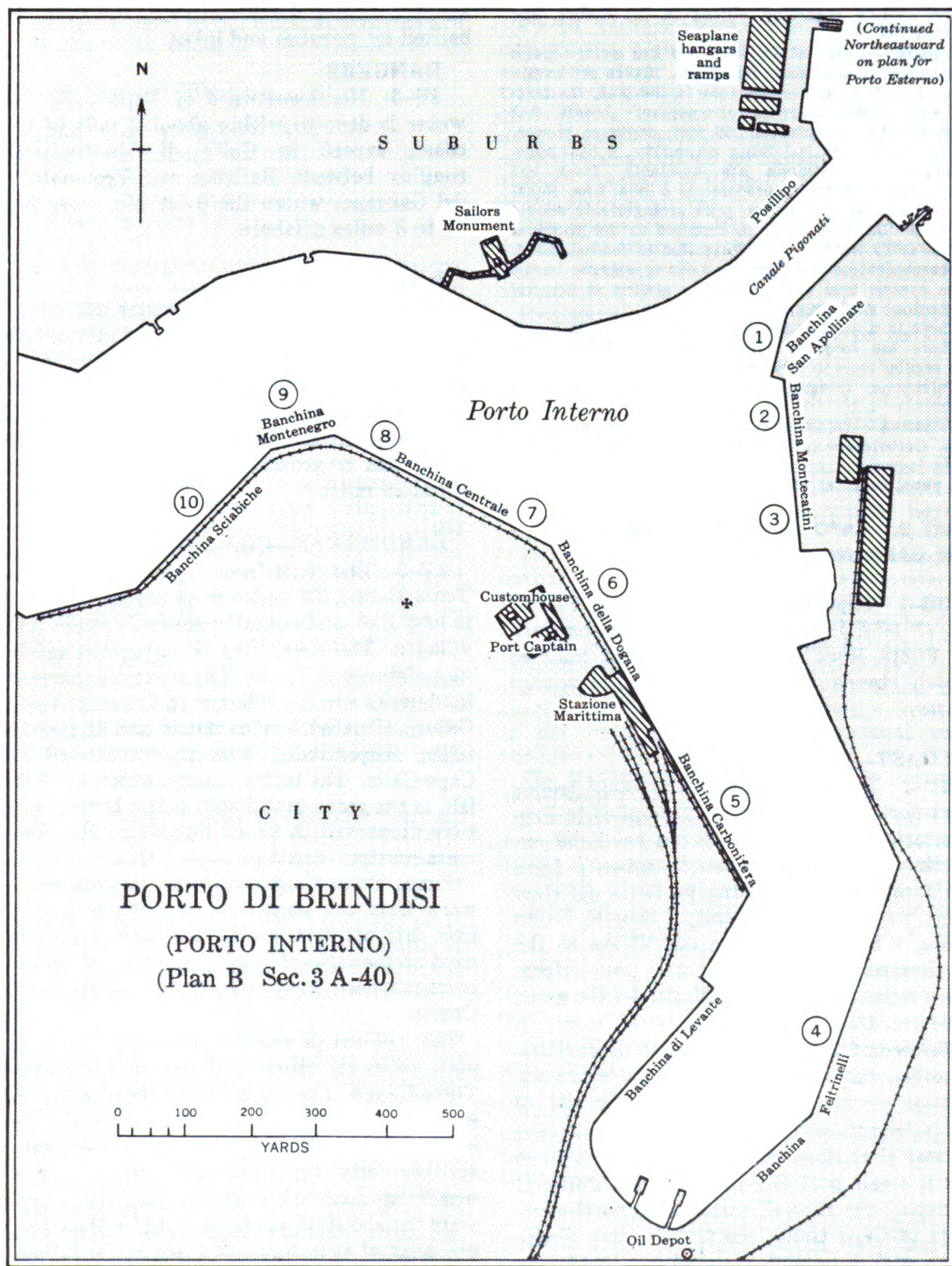
3A-40 Brindisi (Port plan B) is built on a low, almost circular, promontory which is separated from a fertile plain by the two arms of Porto Interno. At the northwestern corner of the ancient wall, which partially surrounds the city, is situated an old castle flanked by huge round towers and is conspicuous from all sides. The northeastern part comprises the old city, whereas the southern and western parts are the more modern. There is an active passenger service, and a considerable import and export trade. The population was about 80,000 in 1962.

Brindisi is a port of first call. The Health and Customs Officials usually board vessels from alongside the quays.

Berths.—(Numbers on Port Plan are for reference only.) Four berths are located at the quays on the eastern side of the southern arm of Porto Interno. Berth No. 1, 275 feet long, is situated at Banchina San Apollinare just southward of Canale Pigonati, and has a depth of 8.5m (28 ft.). Berths Nos. 2 and 3 at Banchina Montecatini, immediately southward of No. 1, have a total length of 750 feet and a depth of 8.2m (27 ft.). Berth No. 4, situated about 600 yards southward of No. 3, has a length of 725 feet and a depth of 8.2m (27 ft.).

Seven berths, served by railway tracks, are located at the quays on the western side of the same arm of the port. Berth No. 5 at Banchina Carbonifera, the southernmost, has a length of 925 feet and a depth of 9.7m (32 ft.). Immediately northward, Banchina Stazione Marittima, used for handling passengers, extends about 540 feet with a depth of 7.9m (26 ft.). Berth No. 6 at Banchina della Dogana, northward of the passenger berth, has a length of 590 feet and a depth of 7.9m (26 ft.). The adjoining berths, Nos. 7 and 8 at Banchina Centrale, have a total length of 1,050 feet and a depth of 7.9m (26 ft.). Berth No. 9 at Banchina Montenegro, westward of the foregoing, has a length of 290 feet and a depth of 7.3m (24 ft.). Fishing and other small craft obtain gasoline at this berth. Banchina Sciabiche, the westernmost, provides Berth No. 10 and has a length of 820 feet and a depth of 4.9m (16 ft.).

There are mobile and floating cranes; tugs are available.



For caution regarding silting in the harbor, see section 3A-24.

Repairs.—Large scale machinery and motor repairs can be made, also some hull work. Divers are available. Two floating drydocks are in the port, the largest having the following dimensions: length, 443 feet; breadth, at entrance, 59 feet; depth on blocks, 6.8m (22 1/2 ft.); lifting capacity, 4,500 tons.

Supplies.—Provisions are available. Deck and engine supplies can be procured at a local firm. Bunkers are available; however, prior arrangements should be made. Drinking water is supplied at the principal berths or by waterboat. Chlorination is recommended.

Communications.—There is railway service to the main system from either the main station at Brindisi or Stazione Marittima.

There is a good coast motor road and one to Rome.

There are frequent ship sailings to Italian ports and regular ones to various foreign ports.

Telephone, telegraph, and radio service is available.

Deratting.—Deratting can be carried out and Deratting Certificates and Deratting Exemption Certificates issued.

A naval hospital will accept seamen.

PART B. CAPO GALLO TO PROMONTORIO DEL GARGANO

3B-1 Capo Gallo (Punta Penna) (40°41' N., 17°56' E.), located 2 miles northwestward of Punta Riso, is a low tongue of land on which stands Torre Penna, a large square tower.

COAST—GENERAL

3B-2 From Capo Gallo the coast trends west-northwestward about 105 miles to Promontorio del Gargano, a large headland extending about 20 miles northeastward from the coast and terminating in Testa del Gargano, its eastern extremity. Scoglio Santa Croce, a rocky islet close off Vieste at the northeastern extremity of the promontory, lies 4 miles northward of Testa del Gargano. (See sec. 4A-1.)

Between Capo Gallo and Porto di Barletta, 86 miles west-northwestward, there are numerous towns, especially in the vicinity of the latter; these towns are connected by the railway that skirts the shore, and each town has a small port for coasters. At Porto di Monopoli, the first of these ports northwestward of Capo Gallo, the flat country disappears and the land maintains a moderate elevation, partially cultivated, almost to Barletta. Between Barletta and Manfredonia,

about 25 miles northwestward, the coast is backed by marshes and lakes.

DANGERS

3B-3 Northwestward of Capo Gallo the water is deep to within about 1 mile of the coast, except in Golfo di Manfredonia, roughly between Barletta and Promontorio del Gargano, where the 6-fathom curve lies up to 3 miles offshore.

NAVIGATION

3B-4 From a position 5 miles northeastward of Capo Gallo, a course of 312° for 108 miles leads to a position 4 miles northeastward of Scoglio Santa Croce (sec. 4A-1) off the northeastern extremity of Promontorio del Gargano. Between these positions this track has a greatest offshore distance of about 25 miles.

LANDMARKS—COASTAL FEATURES

3B-5 The coast from Capo Gallo to Punta Torre Canne, 23 miles west-northwestward, is low, flat, and contains several towers and villages. The coast may be navigated safely at a distance of 1 mile. The most conspicuous landmarks are the villages of Carovigno and Ostuni, situated 4 miles inland and 12 and 16 miles, respectively, west-northwestward of Capo Gallo. The latter village, which is whitish, is the more prominent, being higher and more dispersed. A wreck lies about 2½ miles north-northwestward of Capo Gallo.

Punta Torre Canne projects slightly eastward from the shoreline. A light is shown from this point. A wreck lies about 5½ miles east-northeastward and another 6 miles northeastward, respectively, of Punta Torre Canne.

San Velletri di Fasano, is a small fishing port, about 3½ miles northwestward of Punta Torre Canne. The harbor consists of a northern mole which projects in an easterly direction for about 160 yards and then east-southeasterly for about 100 yards, and a small southern mole which projects northward for about 55 yards. A light is shown on the head of each mole. A depth of 3m (10 ft.) was reported (1959) in the entrance of the harbor with a depth of 2.4m (8 ft.) in the center.

The description of the coast northwestward of Monopoli is continued in section 3B-15.

PORTO DI MONOPOLI

Position: 40° 57' N., 17° 18' E.
 Depths: Entrance, 26 feet.
 Harbor, 23 to 36 feet.
 Quays, 1/2 to 28 feet.
 Port Plan: Section 3B-14.

3B-6 PORTO DI MONOPOLI, situated about 10 miles northwestward of Punta Torre Canne and 33 miles west-northwestward of Capo Gallo, is an artificial harbor formed by two moles. The town of Monopoli is situated on the southwestern side of the harbor.

3B-7 NAVIGATION—NORTHBOUND. — From a position 5 miles northeastward of Capo Gallo, a course of 293° for 34 miles leads to a position 1 mile eastward of the harbor entrance. Vessels from Brindisi need not proceed as far off Capo Gallo as the above position on the coastal track, but may round Capo Gallo at a closer distance as follows: From a position 2 miles northeastward of Capo Gallo, a course of 297° for 33 miles leads to the above position off the harbor entrance.

SOUTHBOUND.—From a position 4 miles northeastward of Scoglio Santa Croce, a course of 140° for 76 miles leads to a position 1 mile northeastward of the harbor entrance.

3B-8 CURRENT.—Generally the current follows the direction of the coast southeastward, and with northerly and northeasterly winds the velocity may build up to 2 or 3 knots.

WIND.—The harbor is well protected from wind from any direction, but sometimes northeasterly and easterly winds blow sufficiently to cause entry between the moles difficult.

If the scirocco is blowing and storm clouds with thunder and lightning appear from the north, a violent shifting of the wind is to be expected, probably from the north. Normally, clouds accompanied with lightning precede easterly winds, especially in winter.

3B-9 DEPTHS.—The entrance channel is about 150 yards wide, with depths of 26 feet. No obstructions are found in the entrance, except the submerged cement blocks that encircle the head of Molo Margherita at a 50-foot radius.

3B-10 LANDMARKS.—The most conspicuous objects from south to north in the port are: the dark pointed campanile of the Duomo; that of the church of San Francesco, quadrangular and having a clock; three chimneys of the cement works in line at the northwestern side of the harbor; and a single stouter chimney of the oil refinery eastward of the cement works.

The city appears like a narrow, low, and white strip when seen from southeastward in clear weather at a distance of 15 to 20 miles.

Westward of the port, the town of Conversano is conspicuous because of its altitude.

3B-11 HARBOR.—The harbor is protected by Molo Margherita, which extends northward from the coast northeastward of the town, and by Diga di Tramontana, which extends eastward from the coast northward of the town; the entrance between their heads is about 220 yards wide.

The western and southern sides of the harbor are indented by four shallow coves. There is a short quay for shallow draft vessels in the northern cove adjacent to the cement works. Banchina della Solfatara is located between the two southernmost coves and will accommodate vessels of moderate draft. Cove Curatori, close southwestward of the root of Diga di Tramontana, was dredged (1960) to 23 feet.

The western part of the harbor is encumbered with reefs. See section 3B-9.

ANCHORAGE for ships depends on the prevailing winds. If the wind is from the north, ships are anchored 2 to 3 miles southeastward of the port entrance. If the wind is from the south, ships are anchored northward of the port. Prevailing winds are normally from the north.

3B-12 LIGHTS.—A LIGHT is shown from the head of Diga di Tramontana.

A LIGHT is shown from the head of Molo Margherita.

3B-13 Pilotage is compulsory for merchant vessels over 400 tons. Vessels are boarded seaward of the entrance. Entry is permitted at any time.

3B-14 FACILITIES.—Monopoli is built on a gentle slope and the part towards the sea is enclosed partially by a wall. The new quarter is more elevated and of modern aspect. There are some industries including an oil refinery,

and a moderate import and export trade. The population is about 37,000.

An oil berth is located on the southern side of the outer part of Diga di Tramontana. Underwater obstructions exist for a distance of about 30 feet southward of the mole, and tankers are berthed at the head of two short narrow piers carrying pipe lines. The depths at the eastern part of the mole are 19 to 26 feet.

Banchina della Solfatara, used for general cargo, has three berths; the southeastern side is 230 feet long with 13 to 21 feet alongside, the northeastern side is 345 feet long with 23 to 28 feet alongside, and the northwestern side is 197 feet long with 13 to 23 feet alongside.

Cove Curatori has two quays; one is 160 feet long with 23 feet alongside, and the other is 312 feet long with 1/2 to 23 feet alongside.

Molo Margherita has a berth 590 feet long with 1/2 to 13 1/2 feet alongside.

SUPPLIES.—Provisions are limited. Water is plentiful and good quality. Diesel oil may be obtained.

REPAIRS.—Repairs of a minor nature can be made. A 300-ton marine railway is available.

There is a railway station, a motor road to the interior, telegraph and telephone service. The port has regular steamer service with other Italian ports.

There is a hospital available for seamen.

LANDMARKS—COASTAL FEATURES (Continued)

3B-15 From Monopoli the coast which is low, rocky, and broken, trends 11 miles northwestward to Mola di Bari. A number of towers, coves, and scattered buildings exist along this stretch of coast.

A dangerous WRECK lies about 3 miles northwestward of Monopoli and about 1 mile off the coast.

POLIGNANO A MARE is a conspicuous town with numerous chimneys, 4 1/2 miles northwestward of Monopoli. The town consists of sprawling whitish houses situated on a craggy coastal bluff.

MOLO DI BARI (41°03'N., 17°06'E.), a town of about 20,000 population is situated about 11 miles northwestward of Monopoli. Its houses have horizontal roofs and appear of equal height. Conspicuous in the town from east to west are: a factory chimney near the beach; two whitish campaniles with pointed

tops; and a dark quadrangular one. The HARBOR is formed by a mole, which has two knuckles, extending about 525 yards eastward from the northern part of the town, and by a straight mole, extending about 165 yards north-northeastward from the southeastern part of the town. Underwater foundations extend 40 yards from the head of the northern mole. Neither mole should be approached too closely because of artificial blocks on the bottom, which extend for a distance of about 33 feet. There are depths of from 3 1/2 to 10 feet in the harbor. Vessels with a maximum draft of 10 feet can enter the port. The harbor is open to the scirocco; however, according to the local people, the most dangerous winds for vessels anchored in the harbor are from north-east and east. Sand bars and seaweed tend to silt up the harbor. A LIGHT is shown from the head of each mole. A hospital is available.

From Mola di Bari the coast trends west-northwestward 11 miles to Porto di Bari; there are numerous towers and houses along this stretch. A LIGHT is shown at Torre Pelosa, a village, situated about 4 1/2 miles west-northwestward of Mola di Bari. A WRECK with a depth of 7 fathoms lies about 2 miles northeastward of Punta San Cataldo Light.

The description of the coast northwestward of Porto di Bari is continued in section 3B-26.

PORTO DI BARI

Position: 41°08'N., 16°52'E.

Depths: Entrance, 36 to 46 feet.

Harbor, 10 to 52 feet.

Quays, 10 to 40 feet.

Tide: Mean range, 0.6 foot; spring range, 0.9 foot.

Port Plan: Section 3B-25.

3B-16 PORTO DI BARI, about 56 miles west-northwestward of Capo Gallo and about 12 miles west-northwestward of Mola di Bari, consists of a breakwater-enclosed harbor, about 1 mile in diameter and known as Porto Nuovo, located between Punta San Cataldo to westward and a point about 1.2 miles east-southeastward. Porto Vecchio, a small craft harbor, lies close southeastward of the latter. The city of Bari is disposed in a wide arc southward of the harbor. Vessels up to 698 feet long with a maximum draft of 35 feet can enter the port.

NAVIGATION

3B-17 Northbound.—From a position on the coastal track 5 miles northeastward of Capo Gallo, a course of 296° for 45 miles leads to a position 1 mile northeastward of the light structure on the head of the mole at Mola di Bari, from whence a course of 294° for an additional 13 miles leads to a position 1 mile northward of the harbor entrance.

From Brindisi.—From a position 2 miles northeastward of Capo Gallo, a course of 300° for 44 miles leads to a position 1 mile northeastward of the light structure on the head of the mole at Mola di Bari, from whence a course of 294° for an additional 13 miles leads to a position 1 mile northward of the harbor entrance.

Southbound.—From a position 4 miles northeastward of Scoglio Santa Croce, a course of 149° for 64 miles leads to a position 1 mile northward of the harbor entrance.

An aeronautical radiobeacon is located at Santo Spirito (sec. 3B-26) in a position about 6 miles west-northwestward of Punta San Cataldo.

CURRENT AND WIND

3B-18 The current follows the coast southeastward, changing direction with fresh southeasterly winds. Northerly winds may increase the velocity to 1 to 3 knots in a southeasterly direction. A counterclockwise current in Porto Nuovo attains considerable force during strong northerly winds. This current leaves the harbor along the outer section of Nuovo Molo Foraneo. During the strength of the current vessels may be set toward Molo San Cataldo.

The prevailing wind is from northwest to southeast through north. Northwestern winds, particularly the *maestrale*, threatens shipping in the harbor.

DEPTHS

3B-19 The entrance has depths of 11m (36 ft.) to 14m (46 ft.) and is obstructed by a wreck located about 1/2 mile northwestward

of the entrance. The northern part of Bacina Grande has depths of 9.8m (32 ft.) to 16m (52 ft.) and contains a foul area. The central portion including that northward of Molo Pizzoli and Molo San Vito, has depths of from 5m (16 ft.) to 9m (29 ft.).

LANDMARKS

3B-20 The first object sighted by day is usually the large building of Torre Campanaria in Palazzo della Provincia southeastward of Porto Vecchio, and next is Punta San Cataldo Lighthouse. At night the illumination of the city has been seen 30 miles, and three greenish lights arranged horizontally on a factory have been seen before the harbor lights. From close inshore the following are conspicuous: Punta San Cataldo Lighthouse; the brown quadrangular campanile of the Duomo in the center of the old city; the Basilica di San Nicola close northeastward; the quadrangular signal tower on a large castle flanking the Duomo close westward; several other prominent buildings; and some chimneys southward and southeastward of Punta San Cataldo Lighthouse.

ANCHORAGE

3B-21 The recommended outside anchorage lies in about 18.4m (10fm) approximately 1,300 yards northwestward of Punta San Cataldo Lighthouse. Inshore, in 9.2m (5 fm) to 16.5m (9 fm), the bottom is rocky and poor holding ground.

Because of the foul area southward of Nuovo Molo Foraneo there is insufficient room in Bacina Grande for a large vessel to anchor.

A prohibited anchorage area lies in the entrance of Bacina Grande between Molo San Cataldo and Nuovo Molo Foraneo. It is almost square in shape and is bounded on two sides by the moles.

Caution.—Generally, the bottom is rocky and covered with a thin layer of mud and sand. Consequently, anchors often become fouled on the bottom. Vessels should have the

the least headway possible when letting go and avoid sudden strain on the chain.

BACINA GRANDE

3B-22 The harbor is protected eastward and northward by Nuovo Molo Foraneo, consisting of five arms, and to northwestward by Molo San Cataldo. Nuovo Molo Foraneo extends northward from the point of land at the old city for about 750 yards, thence northwestward for 675 yards, thence westward for 1,060 yards, thence northwestward for 325 yards, and thence west-northwestward for about 330 yards. Molo San Cataldo extends northeastward about 725 yards from Punta San Cataldo.

The quayed moles forming the older harbor are situated at the southeastern part of Bacina Grande. Vecchio Molo Foraneo extends as a broad quay about 450 yards northwestward from the root of Nuovo Molo Foraneo, thence it continues westward with smaller breadth for about 460 yards. Molo di Ridosso extends northward for about 325 yards from the knuckle of Vecchio Molo Foraneo. Molo San Vito extends northwestward for about 200 yards from a position close to the customhouse, about 270 yards southwestward of the root of Vecchio Molo Foraneo. Works are in progress (1968) on the northeastern side of Molo San Vito in an area about 50 yards wide commencing at the root of Molo San Vito and extending in a northwesterly direction for about 325 yards. Molo Pizzoli, with a knuckle near its root, extends about 585 yards north-northeastward from a position on Corso Trieste southward of the head of Vecchio Molo Foraneo. A mole-protected small craft basin lies southwestward of Molo San Vito.

Shoals with depths of less than 5.6m (3 fm) encumber the southwestern part of Bacina Grande, the area between Molo San Vito and Molo Pizzoli, and the area surrounding the latter mole.

Mariners are CAUTIONED that shoaling has occurred in the basin eastward of Molo di Ridosso, and that rubble from the quay and coal lost overboard have reduced depths alongside the northeastern face of Vecchio Molo Foraneo. Throughout the harbor the bottom is muddy and full of scrap iron.

LIGHTS.—A LIGHT is shown on Punta San Cataldo. Lights are shown on the heads of Molo San Cataldo, Vecchio Molo Foraneo, and Molo Pizzoli. A LIGHT is shown on the western elbow of Nuovo Molo Foraneo.

Two LIGHTS, vertically disposed, are shown on the heads of Molo di Ridosso, and

on the northeastern corner of the quay that is located at the root of San Cataldo.

A LIGHT is shown on the head of the short mole located northward of Molo di Ridosso.

An OBSTRUCTION LIGHT is shown from a tower located about 1/4 mile southwestward of Punta San Cataldo Light.

A RADIOBEACON is located at the light on Punta San Cataldo.

A SIGNAL STATION is located on the castle southward of the root of Molo San Vito.

A SEAPLANE AREA lies between Molo Pizzoli and the square S. Cataldo. After landing the plane may enter the zone between Molo Pizzoli and Molo San Vito. Arrival and departure of the planes is indicated by a green flag on the staff of the signal station. The area must be clear before a plane lands or takes off.

PORTO VECCHIO

3B-23 This harbor, used only by fishing and other small craft, lies southeastward of the old city. It is protected northward by Molo San Antonio, and partially southward by Molo San Nicola. The depths are less than 5.6m (3 fm). Secca Del Monte, almost awash, lies 430 yards northward of the head of Molo San Antonio. The head of Molo San Antonio is marked by a light.

PILOTAGE

Pilotage is compulsory for vessels over 200 tons. Night navigation is prohibited.

DIRECTIONS FOR ENTERING

3B-24 In all cases, but particularly during fresh northerly winds, it is advisable for a vessel to obtain sufficient offing to enable her to approach the entrance on a southeasterly heading.

FACILITIES

3B-25 Bari comprises an old quarter with narrow irregular streets located southward of the root of Nuovo Molo Foraneo, and a well developed new quarter with broad regular streets lying southward and westward of the old quarter. The population is about 300,000. Bari has food processing plants, flour mills, metal plants, extensive rail transportation facilities, and a large oil refinery.

The port has an active import and export trade.

It is a first port of entry. Customs and health authorities board ships at the quays.

BERTHS—NUOVO MOLO FORANEO.—The western (eastwest) leg has a berthing length of 2,600 feet with depths of 24 to 40 feet. The middle (northwest—southeast) leg, has a berthing length of 1,860 feet with a depth of 24 feet. The inner (north—south) leg, has a berthing length of 1,540 feet with a depth of 30 feet. A mole, 12 feet wide, extends about 100 yards southward from a position on Nuovo Molo Foraneo opposite the head of Molo di Ridosso.

VECCHIO MOLO FORANEO.—There is a berthing length of 1,245 feet with depths of 18 to 19 feet.

MOLO DI RIDOSSO.—The western side has a berthing length of 920 feet with depths of 32 to 34 feet. The eastern side has a berthing length of 920 feet with depths of 25 to 26 feet. The wharf, extending south-eastward and thence eastward from the root of Molo di Ridosso, has a berthing length of 1,550 feet with depths of 28 to 30 feet along-side.

MOLO SAN VITO.—Has a berthing length of 1,000 feet with depths of 10 to 14 feet alongside.

MOLO SAN CATALDO.—Has a berthing length of 1,200 feet with depths of 14 to 33 feet alongside.

The remaining berths in the harbor will accommodate smaller craft only.

There are cranes from 2 to 12 ton capacity, and four floating ones. Lighters, and tugs are available.

SUPPLIES.—Limited supplies of fresh provisions are procurable. Water is available from quay connections at a rate of from 15 to 22 tons an hour. There is also a water barge. Fuel oil is supplied by motor barge. Diesel oil is available.

REPAIRS.—Minor repairs to machinery can be effected. The largest of three marine railways has a capacity of 500 tons. Divers are available.

COMMUNICATIONS.—There is a railway station on the main coastal line. Three good motor roads serve the city. There is regular steamer connection with Italian and various foreign ports. There is telegraph and telephone service and a government radio station.

DERATTING.—Deratting can be carried

out and Deratting Certificates and Deratting Exemption Certificates issued.

HOSPITAL.—There is a military and a civil hospital, each with 200 beds.

LANDMARKS—COASTAL FEATURES (Continued)

3B-26 The coast from Punta Cataldo trends west-northwestward for 12 miles to Molfetta, the southeastern part being generally slightly elevated and flat, and the northwestern part rocky and lower. **PUNTA PEZZILO** is a slight projection of land about 3 1/2 miles west-northwestward of Punta San Cataldo.

SANTO SPIRITO is a town built on the shores of a cove, open northward, situated about 4 1/2 miles west-northwestward of Punta San Cataldo. Two breakwaters form a harbor for fishing and small craft. Two **LIGHTS** vertically disposed are shown on each side of the port entrance. An **AERO-NAUTICAL RADIOBEACON** is located near Santo Spirito. At the eastern end of the cove is a gray quadrangular tower.

The town of **Giovinazzo**, partially surrounded by a wall to seaward, stands prominently on the coast 4 miles west-northwestward of Santo Spirito. There is a small harbor at the town. A creek, used by coasting vessels, lies close northwestward of the town. A 1-fathom shoal lies close off the eastern entrance point of the creek.

PORTO DI MOLFETTA

Position: 41°12'N., 16°36'E.

Depths: Entrance, 26 to 30 feet.

Quays, 6 1/2 to 20 feet.

Port Plan: Section 3B-32.

3B-27 PORTO DI MOLFETTA is situated 12 miles west-northwestward of Bari and about 40 miles southeastward of Promontorio del Gargano. The harbor, protected by two moles, is located north-northwestward of the town. Conspicuous are: the church with a quadrangular campanile of Madonna dei Martiri standing isolated on the shore westward of the town; the high wall on the eastern mole, near the center of which rises the lighthouse; and the twin quadrangular towers of the seminary situated near the root of the eastern mole. From a distance, the town presents an imposing appearance.

Vessels up to 295 feet in length with a maximum draft of 21 feet can enter the port.

3B-28 Navigation—Northbound.—From a position 1 mile northward of the entrance of Porto di Bari, a course of 290° for 13 miles leads to a position 1 mile northward of the harbor entrance.

Southbound.—From a position 4 miles northeastward of Scoglio Santa Croce, a course of 160° for 51 miles leads to a position 1 mile northward of the harbor entrance.

3B-29 The harbor is protected eastward by a quayed irregular mole, the outer portion of which is known as Molo Foraneo, extending about 900 yards in a generally northwesterly direction from the northern part of the town. Molo di Ponente (Molo Pennelle) extends north-northeastward from the western side of the town for 300 yards toward the head of the outer mole.

Diga Antemurale, a detached breakwater about 500 yards long, lies about 250 yards northwestward of the head of Molo Foraneo.

Secca San Domenico is a rocky area, about 230 yards long in an east-west direction, with less than 6 feet over it; its northwest end is about 100 yards south-southeastward of the head of Molo di Ponente. Work was in progress (1960) to remove this danger.

3B-30 Depths in the entrance are 26 to 30 feet. Depths of less than 3 fathoms exist in the southern part of the harbor, and also extend about 500 yards offshore of the beach westward of Molo di Ponente.

3B-31 Navigational aids.—A light is shown from the head of Molo Foraneo; another light is shown on the second knuckle from the head.

A light is shown from the head of Molo di Ponente.

A light buoy is moored about 200 yards southeastward of the head of Molo di Ponente.

A light is shown near the northeastern extremity of Diga Antemurale.

Regulations.—Vessels on arrival should proceed to the interior of the port and moor in the position assigned them. Those with inflammable and explosive cargos will moor at the end of the mole.

All vessels must proceed at a moderate speed.

A vessel must not use her steam whistle or siren except for maneuvering signals.

Fishing in the port and in the outer harbor is prohibited.

3B-22 FACILITIES.—Molfetta, population about 60,000, is spread over a large area.

The berth at the outer end of Molo Foraneo has a length of 656 feet with depths of 13 to 20 feet. Southward there are about 1,000 feet of quays with depths of 6 to 15 feet.

Small supplies of fresh provisions are available. Fresh water is available from hydrants on Molo Foraneo.

A 500 ton marine railway is available. Divers can be obtained.

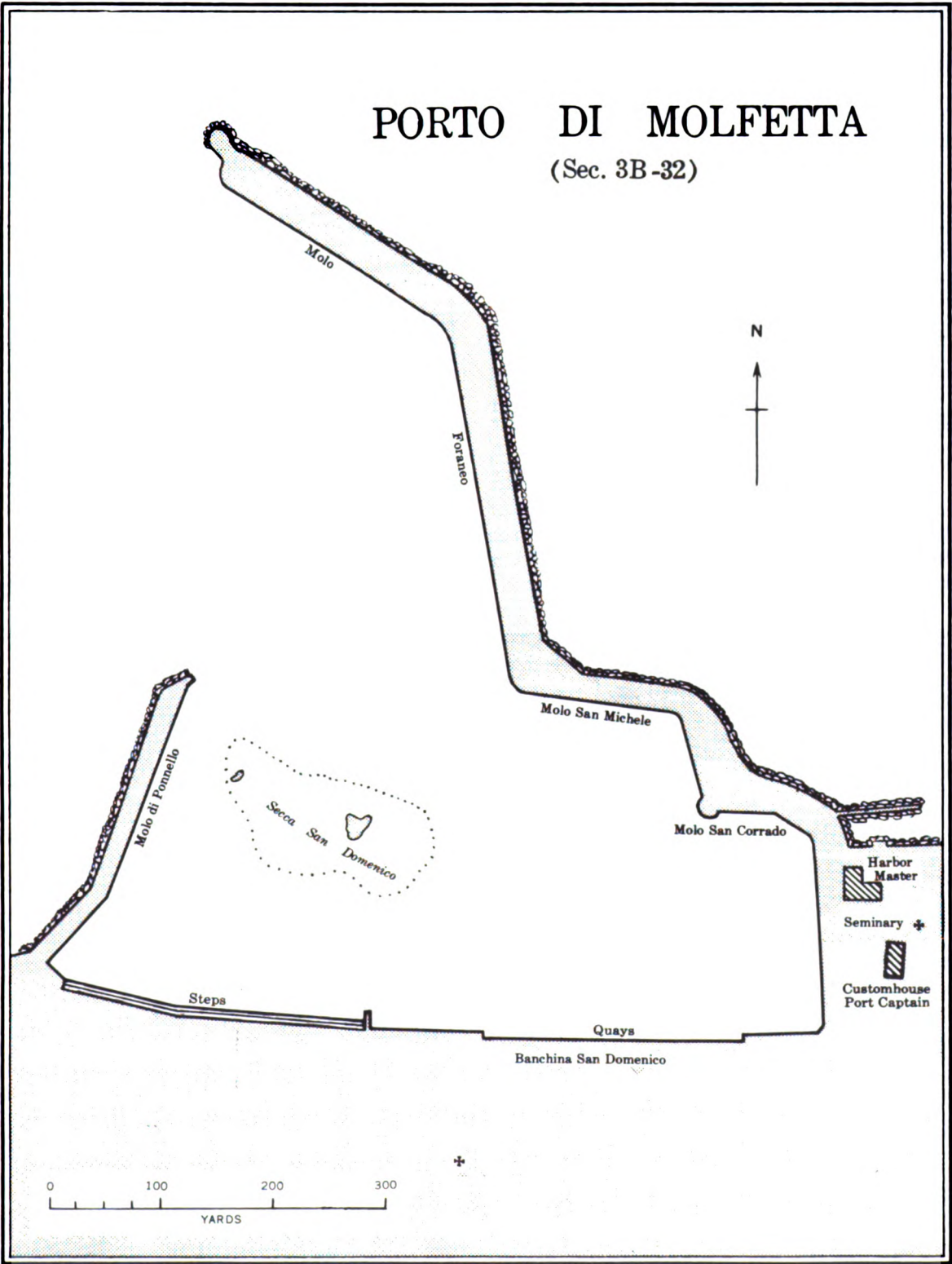
There is a railway station and steamer connections. A hospital is available.

LANDMARKS—COASTAL FEATURES (Continued)

3B-33 From Molfetta the coast trends irregularly west-northwestward for 4½ miles to Bisceglie. The best landmark from a distance offshore is the quadrangular Castel del Monte standing isolated at an elevation of 1,772 feet, about 15 miles southwestward of Bisceglie.

The houses of Bisceglie (41°14' N., 16°30' E.) are predominantly gray and from the center of the town rises the large whitish dome of the cathedral. A harbor consisting of a narrow shallow natural bay with depths of less than 3 fathoms lies northeastward of the town. The harbor is protected on its eastern side by a mole and to northward by another mole. About 30 yards of the outer end of the latter mole has been destroyed by seas. A light is shown from the head of the southeastern mole. Winds from northwest through north to northeast are predominant in winter and, being strong at times, prevent entering or leaving the harbor. Vessels should pass about 55 yards off the head of the southeastern mole and about 80 yards off the head of the northern mole. A hospital is in the town.

From Bisceglie the coast trends 4½ miles northwestward to Trani and consists of rocky and broken terrain sloping abruptly to a narrow sandy beach. About 2 miles northwestward of Bisceglie there are two masonry bridges with numerous arches crossing a stream, and directly northward there is a



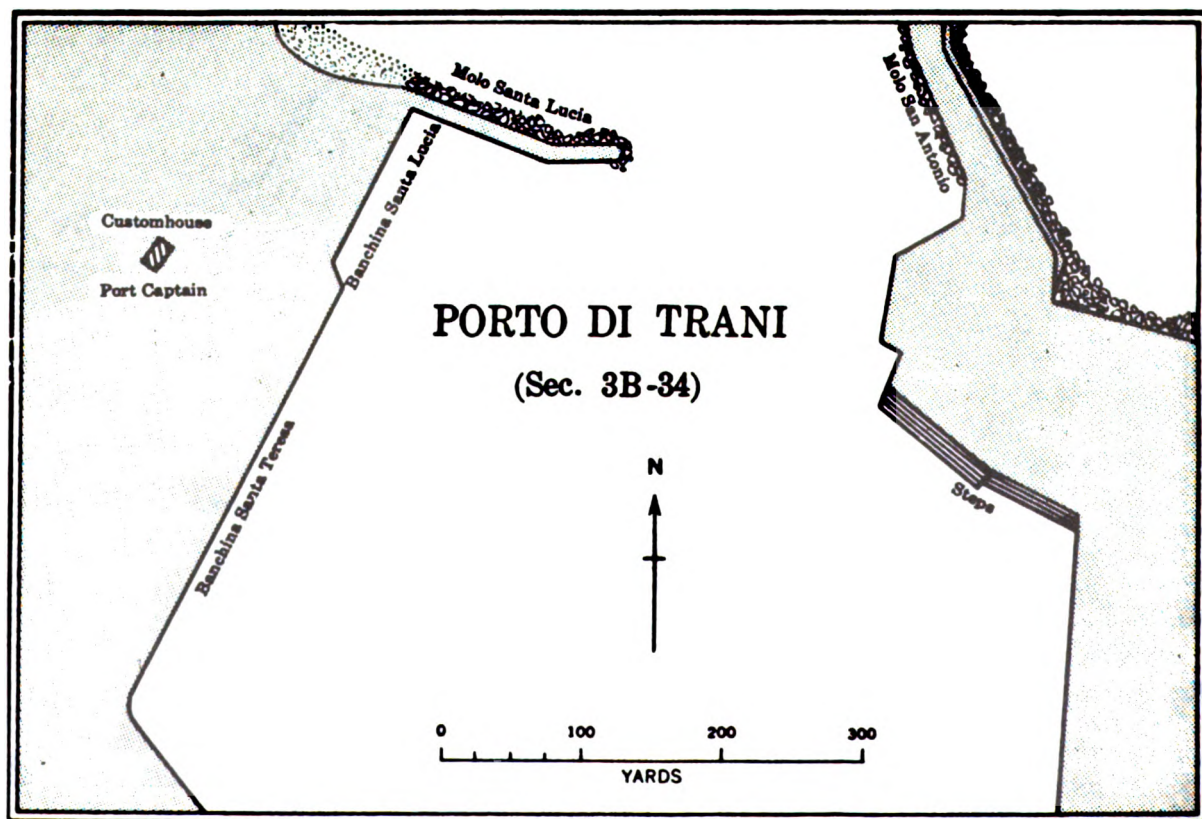
prominent tower. Punta Colonna, rocky and relatively high, on which stands a large whitish convent, projects slightly seaward about 1 mile southeastward of Trani. The village of Andria with three large campaniles situated $6\frac{1}{2}$ miles west-southwestward of Trani is conspicuous from seaward.

3B-34 Porto di Trani ($41^{\circ}17' N.$, $16^{\circ}25' E.$, See port plan), situated $4\frac{1}{2}$ miles west-northwestward of Bisceglie, consists of a natural bay about 330 yards in diameter with completely quayed shores.

The town of Trani, which surrounds the harbor, is composed of low bright colored houses crowded together. Conspicuous in the town are: the Duomo with a quadrangular campanile to westward of the harbor entrance; a castle with two lateral towers on the shore westward of the Duomo; and the high gable and campanile of the church of Madonna del Carmine surrounded by trees eastward of the harbor entrance. There is a civil hospital at Trani.

The harbor is protected by Molo San Antonio which projects north-northwestward 175 yards from the eastern entrance point, with a northerly extension of about 30 yards and Molo Santa Lucia which extends about 100 yards from the western entrance point, providing an entrance about 100 yards wide. Braccio di San Nicola, a groin for the control of silting, extends 380 yards northeastward from a position near the Duomo.

It was reported (1964) that the entrance channel and mooring area of the port had been dredged to 4.5m (15 ft.). Banchina Santa Teresa, 480 feet long; Banchina Santa Lucia, 180 feet long; and the southern side of Molo Santa Lucia; all on the western side of the harbor, have depths of about 4.6m (15 $\frac{1}{2}$ ft.) to 5.2m (17 ft.). Shallow water prevails in the southern and eastern parts of the harbor. Vessels up to 196 feet long with a maximum draft of 14 $\frac{1}{2}$ feet can enter the port.



Anchorage may be obtained outside of the harbor near Braccio di San Nicola over a good holding ground; however, this anchorage is not recommended with wind and sea from the northeast quadrant.

Lights.—A light is exhibited on the head of the extension of Molo San Antonio.

A light is shown on the head of Molo San Antonio.

A light is shown on the head of Braccio di San Nicola.

From Trani a low and sandy coast trends west-northwestward for $6\frac{1}{2}$ miles to Porto di Barletta. Casino Ariscianno, a quadrangular white building in ruins with a broken wall seaward of it, stands on the coast $3\frac{1}{2}$ miles west-northwestward of Trani.

A shoal with depths of less than 5 fathoms borders this coast for a distance as great as $11\frac{1}{4}$ miles.

PORTO DI BARLETTA

Position: $41^{\circ}19' N.$, $16^{\circ}17' E.$

Depths:

Entrance, $29\frac{1}{2}$ feet.

Quays, $19\frac{1}{2}$ to $29\frac{1}{2}$ feet.

Port plan: Section 3B-44.

3B-35 Porto di Barletta has a breakwater-enclosed harbor, about $\frac{1}{2}$ mile in diameter, situated $6\frac{1}{2}$ miles west-northwestward of Trani and about 27 miles southward of Promontorio del Gargano. The port is protected against heavy seas and is considered more secure than any other port on the Italian lower Adriatic. Vessels up to 656 feet in length with a maximum draft of $29\frac{1}{2}$ feet can enter the harbor.

NAVIGATION

3B-36 Northbound.—From a position on the coastal track 1 mile northeastward of the light structure on the mole at Mola di Bari (see sec. 3B-15), a course of 295° for 41 miles leads to a position 1 mile northward of the harbor entrance.

Southbound.—From a position 4 miles northeastward of Scoglio Santa Croce, a course of 163° for 10 miles leads to a position 5 miles eastward of Torre Proposti (see sec. 3B-57), from whence a course of 181° for

26 miles leads to a position 1 mile northward of harbor entrance. See "Caution" sec. 3B-57.

CURRENT AND WIND

3B-37 Current.—During normal weather conditions the current is weak, entering the port along the western mole and flowing out along the eastern breakwater. High water in the port signifies bad weather. If, with a calm wind, there is a light current toward the northwestward along the coast, it presages a fresh scirocco.

Wind.—In winter, northerly and north-easterly winds are frequent, continuing for 1 or 2 days and diminishing in strength at sunset. East-northeasterly winds last about 4 days, frequently diminishing after the second day and then resuming.

DEPTHS

3B-38 The depth of the center of the entrance channel is $29\frac{1}{2}$ feet. In the northwestern part of the harbor and alongside the quays of the western mole depths are from $19\frac{1}{2}$ to 31 feet.

LANDMARKS

3B-39 In clear weather, vessels from northward may identify the position of Barletta by Castel del Monte (see sec. 3B-33) situated about 14 miles southward of the city, and from northeastward by Monte Vulture, 4,364 feet high, situated about 37 miles southwestward of the city.

During reduced visibility the first aspect to be identified is the straight white road leading from Barletta to Andria (see sec. 3B-33) inland and perpendicular to the coast. The town of Trani and particularly the campanile of its cathedral are always visible from off Barletta, while vessels from northward will sight the long white horizontal line of houses of Andria. There is a conspicuous cemetery on the coast about 1 mile westward of Barletta.

Conspicuous in the city are: the whitish campanile of the church of Santa Maria rising from the eastern part of the city; the large bastioned castle close eastward of the

latter church; the large cupola of the church of the Immacolata Concezione situated about $\frac{1}{2}$ mile west-southwestward of the church of Santa Maria; and several chimneys eastward of the castle. Barletta differs from other cities in the vicinity because its houses are not whitewashed.

HARBOR

3B-40 Diga di Levante protects the harbor to eastward and extends as a flat arc, curving westward, for 1,400 yards northward from a position about 450 yards eastward of the castle. The harbor is protected from westward and northward by an irregular shaped quayed mole consisting of Molo di Ponente extending about 400 yards north-northwestward from a position about the same distance northwestward of the castle; Molo Centrale forms a right angle continuation eastward of Molo di Ponente for about 285 yards; whence Molo di Tramontana with two arms continues northeastward for 550 yards. A triangular quay, known as Sporgente Capitaneria, projects eastward from Molo di Ponente. Shoal water occupies the southern and southeastern part of the harbor, and borders the western side of Diga di Levante.

A mooring buoy lies off the seaward part of Molo di Tramontana.

An overhead conveyer, consisting of seven T-shaped pillars connected by steel cables, runs between the western end of Molo di Tramontana and the shore west-southwestward of the end of the same mole. The conveyor connects the loader on Molo di Tramontana with the salt pans inland. No lights are shown on the pillars.

Caution.—The head of Diga di Levante should be given a berth of about 110 yards.

A $5\frac{1}{4}$ fathom patch lies $1\frac{1}{2}$ miles north-northeastward of the head of Diga di Levante.

LIGHTS

3B-41 Lights are shown on each side of the entrance. Barletta Main Light is shown near the head of Molo di Tramontana. A light

is shown on the cupola of the church of the Immacolata Concezione.

ANCHORAGE

3B-42 Anchorage may be taken offshore, either westward or eastward of the harbor. Eastward of the harbor the bottom contains patches of rock, but that westward is mud and sand with good holding properties. The recommended anchorages are in a position with the campanile of the church of Santa Maria bearing 165° , one in a depth of $4\frac{1}{4}$ fathoms at a distance of 1 mile off the western mole, the other in a depth of $5\frac{1}{2}$ fathoms at a distance of 2 miles off the mole.

PILOTAGE

3B-43 Pilotage is compulsory. Vessels are boarded outside the entrance. A vessel should remain eastward of the entrance until boarded by the pilot.

FACILITIES

3B-44 Barletta, population about 52,000, is built on a slight elevation close southward of the harbor. The port has an active import and export trade.

Berths.—Vessels berth at the quays of the western mole. Referring to the port plan, the berth designations and particulars are as follows (Berth numbers are for reference to the port plan only):

Berth No.	Usable length (ft.)	Depth (ft.)
1	480	shallow
2	185	shallow
3	229	31
4 and 5	560	31
6 and 7	610	31
8	135	26
9 and 10	590	24
11 and 12	760	29

With the exception of Berths Nos. 1, 2, and 3, the width of the quays is about 197 feet and have railway tracks.

A few mobile cranes are located on Molo di Ponente.

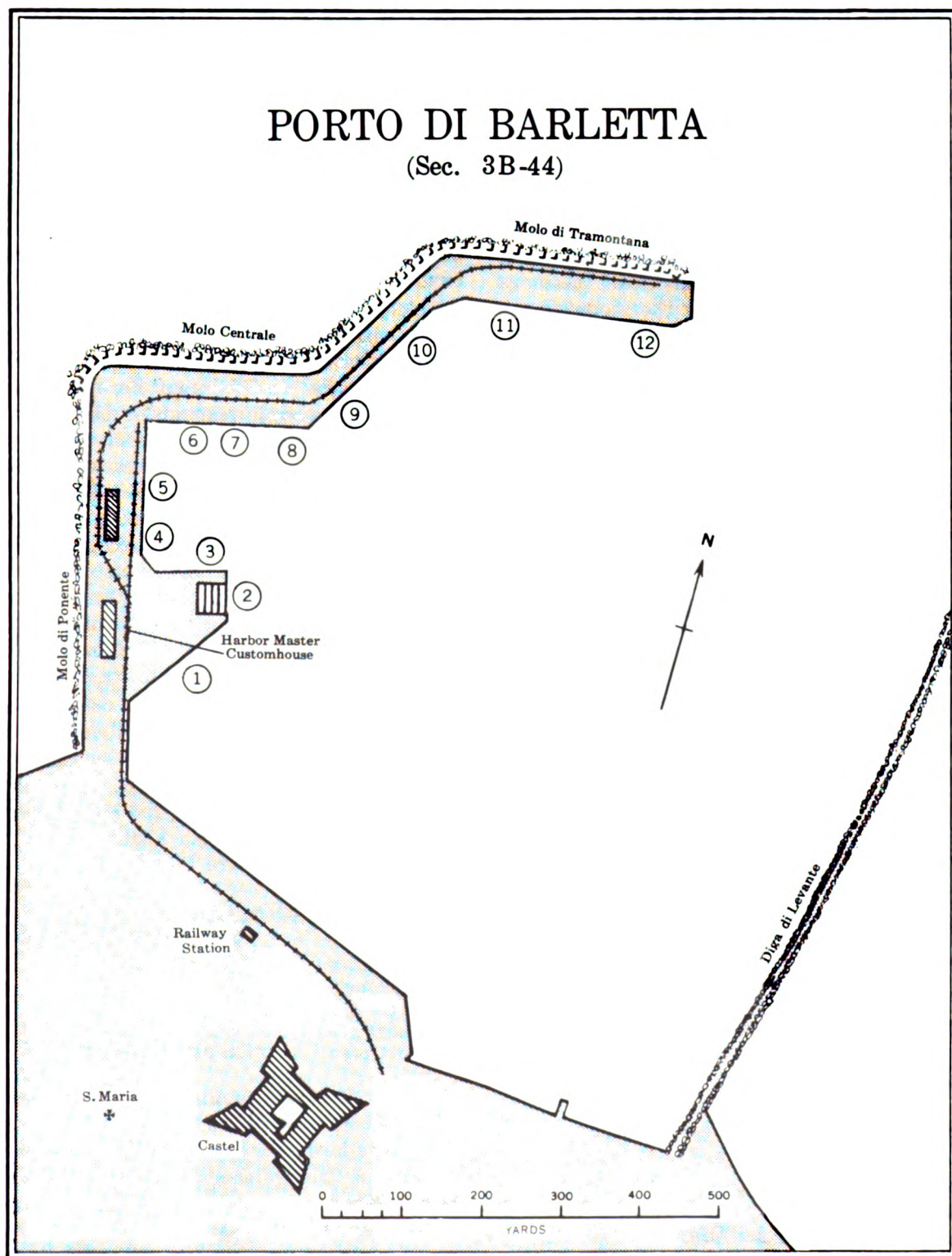
Supplies.—Provisions and fuel and diesel oils are available. Water is piped to the berths.

Repairs.—Minor repairs can be accomplished. Divers are available.

Communications.—The city has railway, telegraph and telephone service. There is regular Adriatic steamer service.

Deratting.—Deratting can be carried out and Deratting Certificates and Deratting Exemption Certificates issued.

Hospital.—There is a hospital in the town.



GOLFO DI MANFREDONIA

3B-45 Golfo di Manfredonia is entered between Barletta and Testa del Gargano, about 30 miles northward. The shore of the gulf from the mouth of Fiume Ofanto, $3\frac{1}{2}$ miles northwestward of Barletta, to a position 3 miles southwestward of Manfredonia is low and marshy, with several lakes inshore, and is backed by an undulating and cultivated plain. Northeastward from the vicinity of Manfredonia the coast becomes high, steep, and backed by the mountainous terrain of Promontorio del Gargano.

A detached rocky patch with a depth of 10.1m (5 $\frac{1}{2}$ fm) lies about 3 miles southeastward of the eastern mole at Manfredonia. Shoals of 10.1m (5 $\frac{1}{2}$ fm) and less, reported in 1959, lie about 5 miles eastward of this mole. A 8m (4 $\frac{1}{4}$ fm) shoal and a 8.3m (4 $\frac{3}{4}$ fm) shoal, lie 3 miles eastward, and 4 miles east-northeastward, respectively, of the same mole. Otherwise, the bottom shoals uniformly shoreward and there are no offshore dangers; the 6-fathom curve lies 2 $\frac{1}{2}$ miles off at its greatest distance.

CURRENT

3B-46 The current follows the coast generally southeastward, and with light winds the velocity is less than 1 knot. With northwesterly winds the current at times attains a velocity of 3 knots. During southeasterly winds the current direction alters to between southwest and west-northwest and may reach a velocity of 1 knot.

LANDMARKS—COASTAL FEATURES

(Continued)

3B-47 About 1 mile westward of Barletta there is a large conspicuous white enclosure containing a cemetery and a pyramidal monument.

Fiume Ofanto discharges through a mouth extending nearly $\frac{3}{4}$ mile seaward about $3\frac{1}{2}$ miles west-northwestward of Barletta. Sediment from this river carried southeastward contributes to silting in harbors in that direction. Torre dell'Ofanto, prominently white and quadrangular, rises above trees

about $\frac{1}{2}$ mile southward of the river mouth.

The town of Margherita di Savoia, which appears as a line of light-colored houses rising from the sea, is situated 3 miles west-northwestward of the mouth of Fiume Ofanto. Two short moles extend northward from the shore; one on each side of the entrance to a canal for small craft extending about $\frac{2}{3}$ mile inland. Three steel bridges cross the canal. A light is shown from the head of the eastern mole.

Conspicuous inland are the village of Trinitapoli with a prominent white cupola situated 3 miles westward of Margherita di Savoia, and the more elevated San Ferdinando di Puglia, 6 miles southwestward of the former.

Between Margherita di Savoia and Manfredonia, $18\frac{1}{2}$ miles northwestward, the coast is low, sandy, and intersected by lakes and marshes. Lago di Salpi, the largest and about 3 miles long, is situated about 5 miles west-northwestward of Margherita di Savoia. It is separated from the sea by a narrow strip of sand, near the center of which prominently stands the tall Torre Pietra. Numerous conspicuous piles of salt are deposited on the beach. A light is shown on the head of a jetty located about $1\frac{1}{2}$ miles west-northwestward of Torre Pietra.

The houses of the village of Zapponeta with some low sheds having red roofs appear prominently on the beach about $4\frac{1}{2}$ miles northwestward of Torre Pietra.

PORTO DI MANFREDONIA

Position: 41°37'N., 15°55'E.

Depths:

Entrance, 7m (23 ft.).

Harbor, 7m (23 ft.).

Quays, 1.9m (6 $\frac{1}{2}$ ft.) to 7m (23 ft.).

Port plan: Section 3B-56.

3B-48 Porto di Manfredonia is situated 25 miles northwestward of Barletta and 17 miles southwestward of Testa del Gargano. It has a triangular-shaped mole-enclosed harbor. The roadstead is considered the best anchorage on the eastern coast of Italy, especially during bora gales. Vessels up to 328 feet long with a maximum draft of $19\frac{1}{2}$ feet can enter the port.

NAVIGATION

3B-49 Northbound.—From a position on the track 1 mile northeastward of the light structure on the head of the mole at Mola di Bari, a course of 302° for 61 miles leads clear of all dangers to the roadstead off Manfredonia.

Southbound.—From a position 4 miles northeastward of Scoglio Santa Croce, a course of 183° for 9 miles leads to a position 2 miles eastward of Torre Proposti, from whence a course of 230° for a similar distance leads to a position 1 mile southeastward of Punta Grugno. From the latter position, a course of 238° for 7 miles leads to the roadstead of Manfredonia. See "Caution" sec. 3B-57.

CURRENT AND WIND

3B-50 Current.—Slight current is experienced at Manfredonia. When southeasterly winds blow the current runs generally southwestward.

Wind.—Light southwesterly wind prevails at night, veering westward at daylight, continuing during the greater part of the forenoon. Southwesterly winds sometimes blow briefly in heavy squalls and make entering and leaving the harbor dangerous.

Although the roadstead offers no protection from the sirocco, this wind seldom blows hard near the land, and the sea is never very heavy in the anchorage.

The bora, locally called monterese, blows in violent squalls down the gorges of Promontorio del Gargano.

Tide.—The tidal range is small with the lowest tide occurring in January and February. A tide gage is located on Molo di Ponente.

DEPTHS

3B-51 The least depth in the harbor entrance is 7m (23 ft.), (1961). Depths alongside quays are from 1.9m (6 1/2 ft.) to 7m (23 ft.). The roadstead has depths of 7.4m (4 fm) to 12.8m (7 fm).

LANDMARKS

3B-52 The best landmark from any direction is the high isolated headland of Gargano, with Monte Calvo, 3,465 feet high, the highest peak, situated about 9 miles north-

westward of Manfredonia. Also conspicuous and the best guide for approaching the roadstead is Monte degli Angeli, 2,907 feet high, located 5 miles north-northeastward of the harbor. The village of Monte San Angelo with a prominent tower at its western limit is visible near its summit.

From closer inshore the following are conspicuous: the lighthouses on the moles; a castle at the eastern side of the town; the cupola of the church of San Domenico near the shore 350 yards southwestward of the castle; and a keep in the form of a truncated cone situated near the root of Molo di Ponente.

ANCHORAGES

3B-53 The recommended anchorage is about 2 miles offshore in about 12m (6 1/2 fm) between Manfredonia and Punta Grugno, 8 miles northeastward. Also used is an anchorage in 11m (6 fm) to 13m (7 fm) with the town bearing 318° and the village of Monte San Angelo bearing 003°. In summer, vessels sometimes anchor in 9.2m (5 fm) about 1/2 mile southeastward of the eastern mole. These anchorages have good holding ground. The above anchorages are not recommended with winds from the south and southwest. Anchorage can be taken inside the harbor, in depths of 7m (23 ft.) off either mole.

HARBOR

3B-54 The harbor is protected to eastward by Molo di Levante which extends 1,065 yards southward from a position near the castle. The mole has a slight knuckle near its outer end and is broadly quayed inshore for two-thirds of its length. Molo di Ponente extends eastward for about 1,000 yards from a position southwestward of the keep, and is also broadly quayed to a knuckle at about midlength. A pier, about 87 yards long extends in a northeasterly direction from a position about 130 yards from the root of Molo di Ponente. Banchina di Tramontana, used by shallow draft vessels, forms the northwestern side of the harbor. A mooring buoy is off the eastern end of this quay. The entrance between the mole heads is about 270 yards wide.

Shoals with a depth of less than 5.5m (3 fm) front the northern side of the harbor for a distance of from 120 to 300 yards.

LIGHTS

3B-55 Manfredonia Light is situated near the root of Molo di Levante.

The head of Molo di Levante is marked by a light.

The head of Molo di Ponente is marked by a light.

A light is shown near the extremity of the pier projecting from Molo di Ponente.

PILOTAGE

Pilotage is compulsory for vessels exceeding 500 gross tons. Pilots board vessels about $\frac{1}{2}$ mile outside the entrance, both day and night.

FACILITIES

3B-56 Manfredonia, population about 40,000 (1962), lies at the foot of Monte degli Angeli, and is surrounded by an ancient wall. There is a moderate import and export trade, bauxite being the largest export commodity.

Berthing space is available along Molo di Levante and Molo di Ponente with depths alongside up to 7m (23 ft.). A pier is located near the root of Molo di Ponente and has 5.8m (19 ft.) alongside.

Supplies.—Provisions, water and oil are available.

Repairs.—Minor repairs can be made. A small marine railway is located here. Divers are available.

Communications.—There is railway, telegraph, and telephone service.

LANDMARKS—COASTAL FEATURES (Continued)

3B-57 The shore between Manfredonia and Monte Saraceno, 7 miles northeastward, is level and at its northeastern end merges with a steep inclination into the sharp ridges of the headland of Gargano. Monte Saraceno, 787 feet high and conspicuously white, slopes steeply eastward into the sea a short distance, forming Punta Grugno.

Between Punta Grugno and Punta Agnuli, $1\frac{1}{4}$ miles northeastward, the white houses of the sprawling town of Mattinata, 1 mile

inland, are visible on the slope of a green hill. Torre del Porto stands on the shore seaward of the village. A light is shown on Punta Agnuli. A white dwelling stands isolated close to the light post.

From Punta Agnuli the coast trends $6\frac{3}{4}$ miles northeastward to Torre Proposti, whence it turns northward for $2\frac{1}{2}$ miles to Testa del Gargano, the most easterly projection of the promontory. The coast, which is steep, rugged and high, is indented with numerous coves containing some underwater rocks and close off-lying islets.

Torre Proposti, $2\frac{1}{2}$ miles southward of Testa del Gargano, consists of a white square masonry structure with a squat tower at one corner standing on a massive reddish-colored base midway up a rocky spur overlooking the sea. A light is shown on the tower.

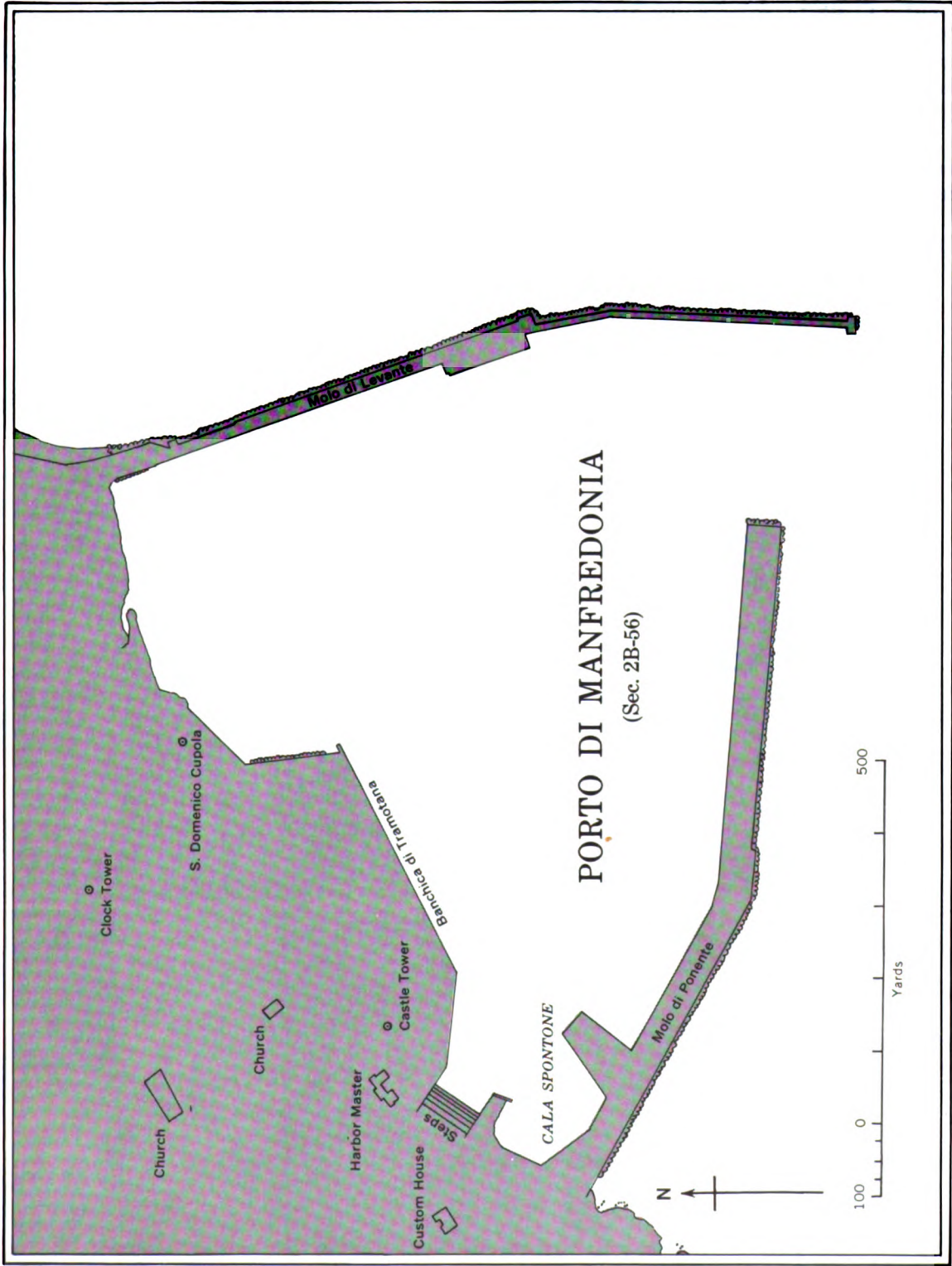
Caution.—A wreck, with 4.6m (2 $\frac{1}{2}$ fm) over it, lies about 3 $\frac{1}{2}$ miles eastward of Torre Proposti.

Testa del Gargano ($41^{\circ}50' N.$, $16^{\circ}12' E.$), 148 miles northwestward of Capo di Otranto, the extreme eastern point of Promontorio del Gargano, is steep and rocky. It is fronted by several rocks lying about 225 yards off-shore, and the remains of an old tower stands on the head. Northward there are a number of towers standing on the coast, and a few rocks lying close offshore.

ANCHORAGES

3B-58 Mola di Bari.—In 13.8m (7 $\frac{1}{2}$ fm) over rock but considered fair holding ground, about $\frac{1}{2}$ mile off the northern mole. (See sec. 3B-15.)

Seno di San Giorgio.—In 12m (6 $\frac{1}{2}$ fm) outside the cove, 6 miles west-northwestward of Mola di Bari (sec. 3B-15), with the center of the viaduct bearing about 225° .



Porto di Bari.—See section 3B-21.

Glovinazzo.—In 25m (13 1/2 fm) over good holding mud about 550 yards offshore with the extreme northern part of the town (sec. 3B-26) bearing about 225°.

Bisceglie.—Northeastward of the head of the moles for vessels working cargo in good weather. (See sec. 3B-33.)

Porto di Barletta.—See section 3B-42.

Margherita di Savoia.—In 10.9m (6 fm) over

mud off the town in range with the moles. (See sec. 3B-47.)

Porto di Manfredonia.—See section 3B-53.

Mattinata.—In 10.9m (6 fm) over mud about 2 miles eastward of Punta Grugno. Greater protection against the gusts of the bora sweeping over the headland of Gargano will be found in a position in 12.8m (7 fm) over good holding mud about 3 miles southward of Mattinata. (See sec. 3B-57.)

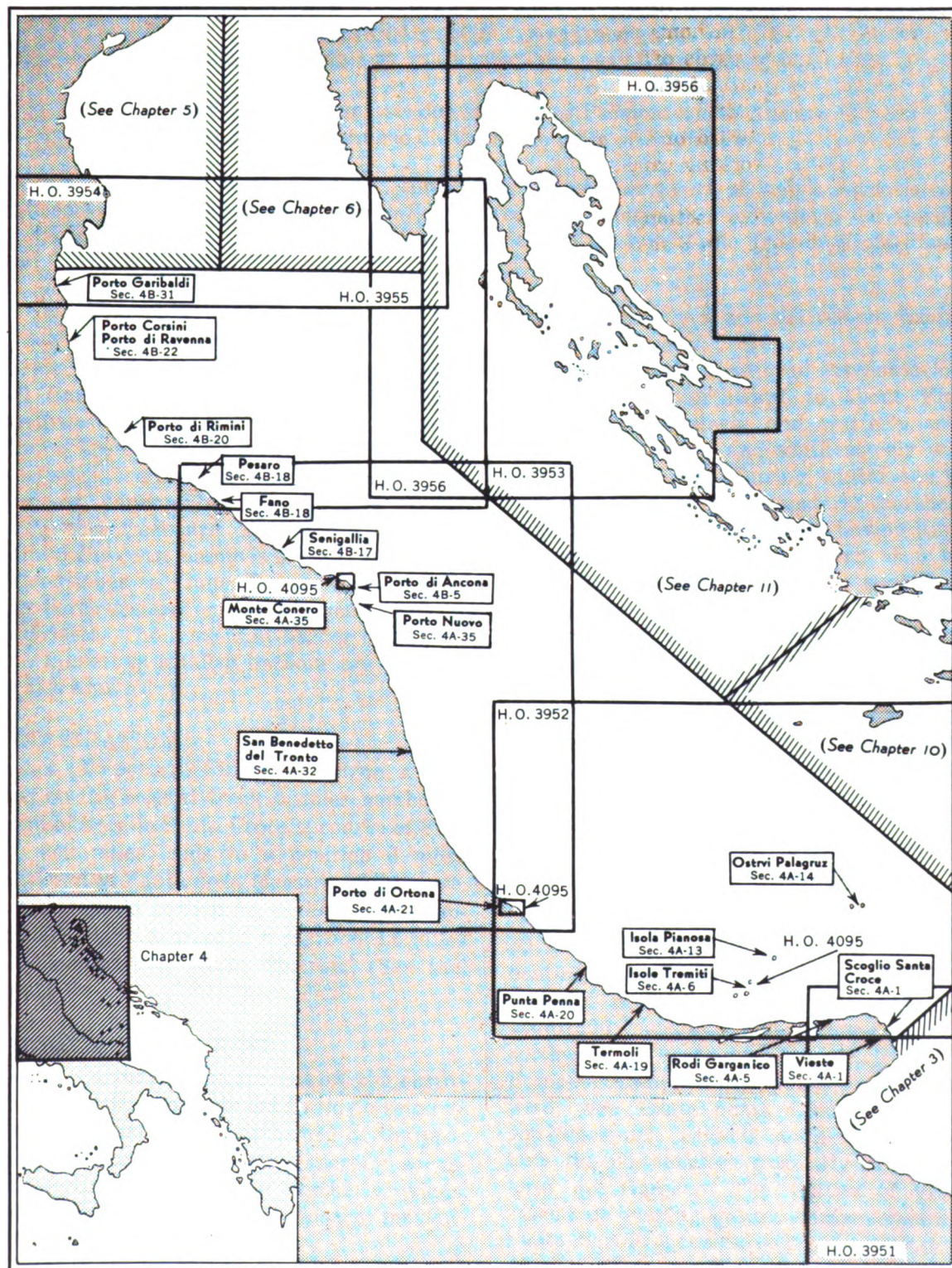


Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Naval Oceanographic Office
Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 4—GRAPHIC INDEX

CHAPTER 4

EASTERN COAST OF ITALY FROM PROMONTORIO DEL GARGANO TO DELTA OF FIUME PO

Part A. Promontorio del Gargano to Promontorio di Ancona.

Part B. Promontorio di Ancona to delta of Fiume Po.

Plan.—The coast in this chapter, comprising the northern part of Italy's Adriatic coast, is described in sequence from Scoglio Santa Croce, off Vieste on Promontorio del Gargano, northward to the delta of Fiume Po, and includes the off-lying Isole Tremiti, Isola Pianosa, and Otočići Palagruž.

GENERAL REMARKS

4-1 The southern part of the coast described in this chapter, from Promontorio del Gargano to Fiume Tronto, 118 miles northwestward, is generally low. Between Fiume Tronto and Rimini, 190 miles northwestward, the coast is somewhat higher, the steepest portion being a 10-mile stretch north-northwestward of Fiume Tronto. At Rimini the coast becomes low and sandy and so continues to Fiume Po, and beyond it to the northwestern end of the head of Golfo di Trieste. The important harbor of Ancona and numerous smaller harbors are included in this area.

NAVIGATION

4-2 To delta of Fiume Po.—From a position on the coastal track 4 miles northeastward of Scoglio Santa Croce, a course of 319° for 242 miles leads to a position 6 miles eastward of Punta della Maestra Lighthouse. See caution in section 5A-5. This course approaches land nearest in a position 5.5 miles northeastward of Isola Pianosa. (See sec. 4A-13.)

CURRENT AND WIND

4-3 Current.—The current off the northern side of Promontorio del Gargano sets onshore and eastward. Northward of the promontory the current sets generally southeastward; during strong northerly winds, particularly in winter, the velocity may attain 3 knots.

Northward of Fiume Tronto the current follows the coast southeastward; it has a velocity of 1 knot in good weather. During

strong northerly winds the velocity may increase to 2 knots.

Winds.—In the vicinity of Promontorio del Gargano and northward to about Fiume Tronto, southeasterly and westerly winds prevail in summer, and southeasterly winds prevail in autumn. During winter the prevailing winds are northwesterly, northeasterly, and southeasterly, those having easterly components generally last about 3 to 5 days and are accompanied by squalls and heavy rain.

Northward of Fiume Tronto, northwesterly, northeasterly, and easterly winds prevail. In winter strong northeasterly and northwesterly winds with rain squalls predominate, the latter being accompanied with mist. When southwesterly winds blow they are particularly strong.

PART A. PROMONTORIO DEL GARGANO TO PROMONTORIO DI ANCONA

4A-1 Scoglio Santa Croce (Eufemia) (41° 53' N., 16° 11' E.), an islet lies 230 yards east-northeastward of Punta Santa Croce, the northern of two points of land extending about 500 yards seaward, situated 3½ miles northward of Testa del Gargano. Punta San Francesco, the southern point, extends eastward, and Punta Santa Croce, 850 yards northwestward, extends north-northeastward from the northeastern extremity of Promontorio del Gargano. The village of Vieste stands on sloping ground southwestward of Punta San Francesco. A prominent fort, on which is located a black and white checkered signal station, is situated at the southwestern edge of the village. Storm signals

are shown at the station. The modern suburb of Vieste is located at the head of the cove between the two points. An overhead cable stretches between Scoglio Santa Croce and Punta Santa Croce. The cable is about 65 feet above sea level. Passage is forbidden to vessels with rigging higher than 59 feet.

A light is shown from a dark brick octagonal tower, 90 feet high and on which appears the word **VIESTE**, situated at the northwestern end of Scoglio Santa Croce. A radiobeacon operates at the light.

COAST—GENERAL

4A-2 Promontorio del Gargano continues bold, indented, and rocky northwestward and westward about 14 miles from Vieste to the town of Rodi Garganico, whence a long sandy beach begins, which extends almost as far as Monte Conero, a mountain close south-eastward of Ancona. From Rodi Garganico to Fiume Tronto, a distance of about 160 miles, the coast is sparsely settled and is mostly cultivated only near the towns. Porto di Ortona is the only harbor of importance along this stretch of coast.

Between Fiume Tronto and Monte Conero, about 42 miles north-northwestward, the coast continues generally low and sandy, the foothills of the Appenines being evident at wide intervals. These hills do not reach closer than about $\frac{1}{2}$ mile of the coast, except between Cupra Marittima and Porto San Giorgio, a steep 10-mile stretch beginning 8 miles northward of Fiume Tronto; the hills are well cultivated and contain numerous villages.

The off-lying Isole Tremiti, Isola Pianosa, and Ostrvi Palagruž are situated between 12 and 30 miles northward of Promontorio del Gargano.

DANGERS

4A-3 The coast between Promontorio del Gargano and Promontorio di Ancona is notably free of dangers. From the former to Fiume Tronto, about 120 miles northwestward, the 6-fathom curve lies a little more than 1 mile offshore, and between the river

and Promontorio di Ancona it lies about 2 miles offshore. The depths shoal uniformly shoreward. (See sec. 4A-20.)

NAVIGATION

4A-4 Along the coast.—This coast may be navigated safely by remaining outside the 6-fathom curve. (See sec. 4A-3.)

To Promontorio di Ancona.—From a position 4 miles northeastward of Scoglio Santa Croce, a course of 312° for 158 miles leads to a position 5 miles northeastward of Promontorio di Ancona. This course approaches land nearest in a position 2.2 miles northeastward of Isola Pianosa. (See sec. 3A-13.)

LANDMARKS—COASTAL FEATURES

4A-5 The coast from Vieste trends 6 miles northwestward, whence $2\frac{3}{4}$ miles westward to the village of Peschici, and consists of numerous short points of land and coves. There is a scattering of towers on the shore.

Peschici is situated on the top of a barren promontory which appears as a rocky wall descending vertically into the sea. The tree-covered promontory of Monte Pucci is visible about 1 mile westward.

From Peschici the coast trends westward for 6 miles to Rodi Garganico. Conspicuous along this stretch of shore is a long wall with arched openings for the protection of the contained citrus groves which, from a distance, appears as an arched viaduct.

Rodi Garganico ($41^\circ 56' N., 15^\circ 53' E.$) a town with a population of about 5,000, is situated about $\frac{1}{2}$ mile from the shore on a sloping hill surrounded by citrus and olive groves. Conspicuous in the extreme western part of the town is a bright yellow church cupola. A cement mole, about 220 yards long, extends northeastward from the eastern part of the town, but will accommodate only small craft. A light is shown from a post on a white cylindrical masonry hut, situated near the head of the mole.

The description of the coast westward is continued in section 4A-18.

OFF-LYING ISLANDS**ISOLE TREMITI—GENERAL DESCRIPTION**

4A-6 Isole Tremiti ($42^{\circ}07' N.$, $15^{\circ}30' E.$) a group of four islands situated 36 miles west-northwestward of Testa del Gargano and 12 miles northward of the coast of Promontorio del Gargano, occupy a distance of nearly 3 miles in a northeast-southwest direction. They comprise the islands of San Domino, San Nicola, Caprara, and Cretaccio, and are populated principally by Italian penal prisoners, and a few fishermen. The islands are low by comparison with the mainland and are not visible, except in clear weather, from a distance greater than 20 miles. The highest land is a hill at the southern end of Isola San Domino, 377 feet high. Their coasts, especially on the northern side, are generally steep and inaccessible.

CURRENT, WIND, AND TIDE

4A-7 Current.—Between the islands and the headland of Gargano the current is generally east-southeastward. In the channels between Isola Cretaccio and the adjacent islands there is a strong tidal current, which if unaffected by wind, changes direction regularly every 6 hours.

Wind.—The prevailing winds are northeasterly and southeasterly. The libeccio, locally called garbino, if strong, is as dangerous as the bora. However, the latter is the more violent and lasts 4 or 5 days. Abnormal high tides with strong currents always indicate exceptionally bad weather.

Tide.—The high-water interval is 4 h. 05 m.; the mean range is 1 foot 3 inches.

LANDMARKS—ISLAND FEATURES

4A-8 Isola San Domino, the largest and southwesternmost of the group, is also the most fertile and cultivated. Its shores are rocky, broken, and contain a number of grottoes. Toppa del Canio, the eastern extremity of the island, is a short yellowish peninsula terminating in a beach. A reef, with a depth of less than 3.7m (2 fm) at its western end,

extends about 250 yards west-southwestward of Punta del Coccodrillo, a sinuous peninsula on the northwestern shore. With the exception of the foregoing and the reef surrounding Toppa del Canio, there are no off-lying dangers. A light is shown from the southwestern extremity of the island.

4A-9 Isola San Nicola lies with its southwestern extremity about 450 yards eastward of Toppa del Canio, to which it is connected by a reef with less than 3.7m (2 fm) of water over it. This island contains practically the total population of the group. The village of Tremiti, consisting of a group of buildings, a church, and a signal station stands on the flat elevated southwestern end of the island. There is a short quayed mole southwestward of the village to which it is connected by a winding road. Two lights, vertically disposed, are shown from the head of the mole.

A mooring buoy is located about 275 yards west-northwestward of Isola San Nicola Light.

4A-10 Il Cretaccio, the smallest of the group, is yellowish and extremely irregular, and lies about 170 yards off the northeastern end of Isola San Domino on the reef connecting the latter with Isola San Nicola. Scoglio la Vecchia, which is blackish and surrounded by smaller rocks, lies close off the eastern extremity of Il Cretaccio. Secca del Cretaccio with a least depth of 1.6m (5 ft.) extends 220 yards northeastward from the northern end of Il Cretaccio. The passage between this island and Isola San Domino and Isola San Nicola will accommodate only shallow draft craft.

A mooring buoy is located about 165 yards southward of Scoglio la Vecchia.

4A-11 Isola Caprara, the northeasternmost of the group, is steep on its northern side, slopes gradually southward, and is separated from Isola San Nicola by a passage 360 yards wide, in the fairway of which there

is a depth of 8.2m (27 ft.). An isolated rocky patch with a depth of about 7.4m (4 fm) lies about 140 yards southward of the southern extremity of the island. A rocky shoal with a depth of 5.2m (17 ft.) lies about 1/4 mile north-northwestward of the southern extremity of the island. Punta Secca is the extremity of a narrow, high, sinuous peninsula extending 550 yards eastward from the north-eastern side of the island. A shoal with a depth of 6.8m (22 ft.), lies about 150 yards northeastward Punta Secca. A light is shown on the northern side of the peninsula.

4A-12 Anchorages.—A vessel can anchor in 31m (17 fm) to 64m (35 fm) over good holding mud about 600 yards off the south-eastern shore of Isola Dan Domino. The nearer a vessel anchors to the southwestern end of Isola San Nicola, the better the protection from the bora.

With east-northeasterly gales, there is shelter close westward of the southern end of Isola Caprara.

Anchoring and fishing is prohibited in an area about 200 yards wide extending about 450 yards east-southeastward from the south-eastern shore of Isola San Domino.

ISOLA PIANOSA

4A-13 Isola Pianosa (42°13' N., 15°45' E.) which is low, about 10 feet high, and rocky, is situated 11 miles northeastward of Isola Caprara. It is about 740 yards long from east to west. Its northern shore is steep to but elsewhere a bordering reef with depths of less than 9.2m (5 fm) exists for a distance of about 150 yards offshore. The currents in its vicinity are, at times, strong and uncertain in direction. Because of these currents, vessels passing the island at night or in thick weather should give it a wide berth. A light is shown from the island.

OSTRVI PALAGRUŽ (SOLE PELAGOSA)

4A-14 General description.—Ostrvo Palagruž Veliki and Ostrvo Palagruž Mali (42°-23' N., 16°15' E.) (Ceded to Yugoslavia 1947) lie nearly in the middle of the Adriatic, 25 miles east-northeastward of Isola Pianosa and about midway between Testa del Gargano and Ostrvo Lastovo.

A vessel should avoid approaching these islands closely, especially at night or in thick weather, on account of currents. It is recommended to pass westward of the islands.

Caution.—The current between Ostrvi Palagruž and Otocic Galiola sets toward the southwest at a rate of 1 knot to 1½ knots. It is advisable not to pass between the islands at night or with reduced visibility.

4A-15 Ostrvo Palagruž Veliki, a high, rocky, uncultivated island, is about 1,500 yards long from east to west, and rises to a height of 285 feet near its western end. Hrid Pampano, a small above-water rock lies about 300 yards westward of the western extremity of the island. Hridine Manzi are a group of sharp-peaked rocks lying between the island and Hrid Pampano. A reef with a depth of 1.8m (1 fm) extends about 175 yards off the southeastern end of the island. A light is shown from the summit of the island. Another light is shown close eastward of the lighthouse.

4A-16 Ostrvo Palagruž Mali, a rocky and irregular island, 127 feet high, lies with its western extremity about 200 yards south-eastward of the larger island. Several islets and above-water rocks lie southward and eastward at an extreme distance of 300 yards.

4A-17 Otočić Galiola, 19 feet high, is situated about 3 miles east-southeastward of Ostrvo Palagruž Mali. Reefs lie within a radius of 500 yards of the islet. Grebeni Pampan with depths of less than 1.8m (6 ft.) which breaks, lie about 900 yards eastward of the islet.

LANDMARKS—COASTAL FEATURES (Continued)

4A-18 Promontorio di Monte d'Elio (41°-55' N., 15°38' E.).—A spur from the mountains of the headland of Gargano extends northward slightly into the sea forming Promontorio di Monte d'Elio, about 12 miles westward of Rodi Garganico. (See sec. 4A-5.) On the northernmost point of the promontory stands Torre Mileto and a few low white huts. Lago di Varano lies eastward,

and Lago di Lesina lies westward of the promontory, and are separated from the sea by a sandy strip of land consisting of dunes covered by sparse growth. These lakes connect with the sea, the principal channel being Canale di Capoiale which opens from Lago di Varano to the sea between two moles, 2 miles eastward of Torre Mileto. The canal is accessible to craft with a maximum draft of 4 to 5 feet and a maximum length of 32 feet.

A prohibited anchorage area 1 mile wide, extends 6 miles north-northwestward from a position about 1 mile eastward of Torre Mileto.

From the mouth of Fiume Fortore, 15 miles westward of Torre Mileto and near the western extremity of Lago di Lesina, the coast trends west-northwestward for about 14 miles to Termoli. The shore consists of a low sandy beach backed by wooded groves without landmarks except for Torre Fantina which rises prominently from the beach, 6 miles westward of Fiume Fortore. This is a whitish quadrangular tower and near it stands a red two-story railway station with a larger yellow building close by. Several towns are visible a few miles inland. San Martino in Pensilis, about $7\frac{1}{2}$ miles southwestward of Torre Fantina, can be easily recognized by the steeple which stands in the center of town and a white reservoir.

Anchorage can be obtained northward of the mouth of Fiume Fortore about 1 mile offshore in 16.5m (9 fm) to 18.3m (10 fm) sand. With easterly winds or the sirocco, it is one of the best anchorages until Ancona. Northerly winds cause the anchorage to become untenable.

The coastal railway which withdrew from the coast westward of Barletta to pass inland of the mountains of Promontorio del Gargano, again approaches the coast eastward of Torre Fantina and thence follows the coast as far as Rimini.

4A-19 Termoli ($42^{\circ}00' N.$, $15^{\circ}00' E.$).— This town, population about 7,000, is situated on a flat rocky peninsula, 69 feet high, extending a short distance northward from a position 53 miles westward of Vieste. The old town lies on the extremity of the peninsula and is enclosed by a prominent wall,

whereas the new town lies southward on a small flat-topped hill. Conspicuous are: a low brown quadrangular tower at the western side of the root of the peninsula; a church with a low campanile; and a cemetery with some whitish buildings enclosed by a wall westward of the town on a slight elevation. A hospital is in the town.

A small harbor, about 300 yards in diameter, is formed to eastward of the peninsula by two moles. Molo Nord extends in an easterly direction for about 210 yards, then dog-legs to the southeastward for a similar distance and thence in a northeasterly direction for about 200 yards from a position about 55 yards northwestward of the extremity of the southeastern section. The east and southeast section of Molo Nord are quayed. Molo Sud extends in an easterly direction for about 230 yards.

A light is shown from a tower of the Citadelle in the town; a radiobeacon transmits at the light.

A light is shown on the head of each mole and on the extremity of the southeastern dog-leg of Molo Nord.

The depths in the entrance (1959) are 4m (13 ft.) to 4.3m (14 $\frac{1}{2}$ ft.) and in the center of the harbor depths of 3m (10 ft.) to 3.3m (11 ft.) can be found. The depths decrease rapidly toward the shore and toward the root of Molo Nord.

The usual anchorage is in depths of 18.3m (10 fm) to 20.1m (11 fm) from 1 $\frac{1}{2}$ to 2 miles northward and northeastward of the town, but with winds from north, east, or southeast, vessels must leave. A preferable anchorage during offshore winds is in 13.8m (7 $\frac{1}{2}$ fm) about 5 miles west-northwestward of Termoli.

4A-20 From Termoli a low sandy beach backed inland by mountains trends west-northwestward 14 miles to Vasto Marina (ex-Istonio Marina), whence a rocky bluff coast, partially covered with olive groves and vineyards and closely bordered by rocks, extends northward $4\frac{1}{2}$ miles to Punta Penna. With depths to 7m (23 ft.), the port of Vasto can accommodate ships to 10,000 tons. It is located only 5 $\frac{1}{2}$ miles from an industrial complex. For cargo operations ships can use the 295m (968 ft.) wharf along the Eastern Mole, the 90m (295 ft.) wharf along the Martello Mole, or the 40m (131 ft.) wharf along the Southern Mole. Vasto is being further

improved and expanded (1969) to satisfy demands of this industrial complex.

Punta Penna ($42^{\circ}10' N.$, $14^{\circ}43' E.$), a dark-colored flat-topped rocky point, 75 feet high, extends a short distance from a position $16\frac{1}{4}$ miles northwestward of Termoli. On the point stands a tower and a small building with a flagstaff close southward of it. Calla Lotta is a cove lying directly westward of Punta Penna.

Porto di Punta Penna, is a port of refuge situated in this cove between two breakwaters. The eastern breakwater extends about 440 yards north-northwestward from Punta Penna. Near its head is a mole which extends about 130 yards west-southwestward. The western breakwater extends about 460 yards northward. A mole, about 125 yards long, extends in a northeasterly direction from a position about 150 yards northward of the root of the western breakwater. The distance between these moles is about 120 yards with depths of 4.9m (16 ft.) to 6.7m (22 ft.). The entrance between the heads of the two breakwaters is about 150 yard wide with depths of from 6.1m (20 ft.) to 8.8m (29 ft.). Anchorage can be taken in about 6.1m (20 ft.) of water, sandy bottom, westward of the eastern breakwater head. Vessels may not berth alongside the western breakwater except in case of emergency.

A light is shown about 360 yards southward of Punta Penna. Lights are shown on the heads of the western breakwater, the eastern breakwater, and on the heads of the moles projecting from these breakwaters.

A small conspicuous pillar is located on Punta Lotta.

A wreck lies about $2\frac{1}{4}$ miles east-southeastward of Punta Penna.

The coast from Punta Penna to Punta Rocca San Giovanni (Punta di Cavalluccio), 11 miles northwestward, is sandy and is pierced by a number of rivers. The mouth of Fiume Sinello, 3 miles northwestward of Punta Penna, is crossed by a three-arch masonry bridge, and prominent close by is a long masonry viaduct with many arches. Fiume Sangro, $5\frac{1}{2}$ miles northwestward of Fiume Sinello, flows through a wide valley and is crossed at its mouth by a long railroad bridge; 2 miles upstream it is crossed

by another bridge with arches. The town of Paglieta is visible from sea on a hill in the river valley.

Punta del Moro, which is rocky and is pierced by a railway tunnel, lies 5 miles northwestward of Punta Rocca San Giovanni. From Punta del Moro the coast continues northwestward for $11\frac{1}{2}$ miles to Ortona. A number of rocks lie $\frac{1}{4}$ mile offshore of a position about 1 mile northwestward of Punta Rocca San Giovanni. The town of San Vito Chietino, 2 miles south-southeastward of Punta del Moro, is situated on the top of a hill which slopes steeply to the beach. Conspicuous at the edge of the town and overlooking the sea is a church with a surrounding balustraded balcony which appears from sea as a gray bastion. At Marina San Vito Chietino near the mouth of Torrente Feltrino there is a short mole. A light is shown from a mast on the head of the mole.

PORTO DI ORTONA

Position: $42^{\circ}21' N.$, $14^{\circ}25' E.$

Depths:

Entrance, 5m (16 $\frac{1}{2}$ ft.)

Northern part of harbor, 5m (16 $\frac{1}{2}$ ft.)

Quay, 3.1m (10 $\frac{1}{2}$ ft.)

Port plan: Section 4A-30.

4A-21 Porto di Ortona, situated 17 miles northwestward of Punta Penna, consists of a mole-enclosed harbor, about 1,100 yards in diameter, lying southeastward of a small peninsula on which stands the town of Ortona.

4A-22 Navigation—Northbound.—From a position 4 miles northeastward of Scoglio Santa Croce Lighthouse, the coastal track course of 312° continued for 4 miles leads to a position 5.5 miles northward of the lighthouse, from whence a course of 281° for 33 miles leads to a position 2 miles southwestward of the lighthouse near Punta del Diavolo, the southwestern end of Isola San Domino. (See sec. 4A-8.) From the latter position a course of 289° for 48 miles leads to a position 1 mile eastward of the harbor entrance.

Southbound.—The following courses from the positions indicated will lead to a position 1 mile eastward of the harbor entrance:

From close off Pličina Albanež (Secca Pericolosa) Lighthouse (sec. 6B-7), 170.5° for 144 miles.

From a position 6 miles westward of Hrid Sveti Ivan (Scoglio San Giovanni in Pelago) Lighthouse (sec. 6B-24), 165° for 165 miles.

From the entrance of Porto di Lido (Venice) (sec. 5B-26), 155° for 201 miles. This course will bring a vessel through a position 1.75 miles off Punta Mezzaluna and over a least depth of 6¾ fathoms off Porto Recanti.

4A-23 Current.—The current sets generally southeastward and during strong northerly winds, especially in winter, may acquire a velocity of 3 knots. Strong steady easterly wind may produce a reversal of direction for a brief period. Prolonged strong northeasterly wind causes a current to enter the harbor.

Winds.—Easterly and southeasterly winds prevail, the former being troublesome to ships in the harbor. The roads are partially protected from the latter by Punta Penna, although they bring rain and mist. Northeasterly winds are so strong sometimes that seas break over the mole rendering the anchorage in the harbor dangerous, in which case it is advisable to moor stern to the quay with the port anchor down with chain leading southeastward.

4A-24 Depths.—The entrance and the channel leading to Molo Martello was dredged (1962) to 16½ feet and is marked by buoys.

4A-25 Landmarks.—There is a conspicuous chimney in a small valley southeastward of the town, and midway between it and the town stands the isolated church of Santa Maria di Costantinopoli. The Cathedral cupola, in the northern part of Ortona is conspicuous.

4A-26 Anchorage.—The recommended anchorage exists in 6 fathoms over good holding ground about 1 mile northeastward of the root of Molo Nord.

4A-27 The harbor is formed northward by Molo Nord which is narrowly quayed and

which extends about 1,700 yards east-south eastward with two knuckles from a position close eastward of a castle in ruins. Molo Sud extends about 1,200 yards east-northeastward with one knuckle from a position on the shore about 1,600 yards southward of Molo Nord. A damaged spur extends about 150 yards northeastward from about the center of the first knuckle, from the shore, of Molo Sud. Molo Martello, about 150 yards long, projects southwestward from the second arm of Molo Nord. The entrance between the two moles is about 320 yards wide.

The entire western side of the harbor from the head of Molo Sud to close southward of the root of Molo Nord is occupied by shallow water. The southern side of Molo Nord eastward of Molo Martello is fronted by a shallow reef, 150 yards wide in places. A basin, extends west-northwestward and northwestward for about 500 yards from the root of Molo Martello. There is a depth of 14 feet alongside the northwestern end of this basin and the channel leading to it is periodically dredged to about 15 feet.

4A-28 Lights.—Ortona Light is shown near the root of Molo Nord and a light is shown on the head of this mole. A light is shown on the head of Molo Sud and a light is shown on the head of Molo Martello.

4A-29 Pilotage.—Some local mariners are authorized to perform pilotage.

Caution.—The head of the moles at the entrance should be given a berth of at least 145 yards.

Obstructions lie close off the western side of the head of Molo Martello.

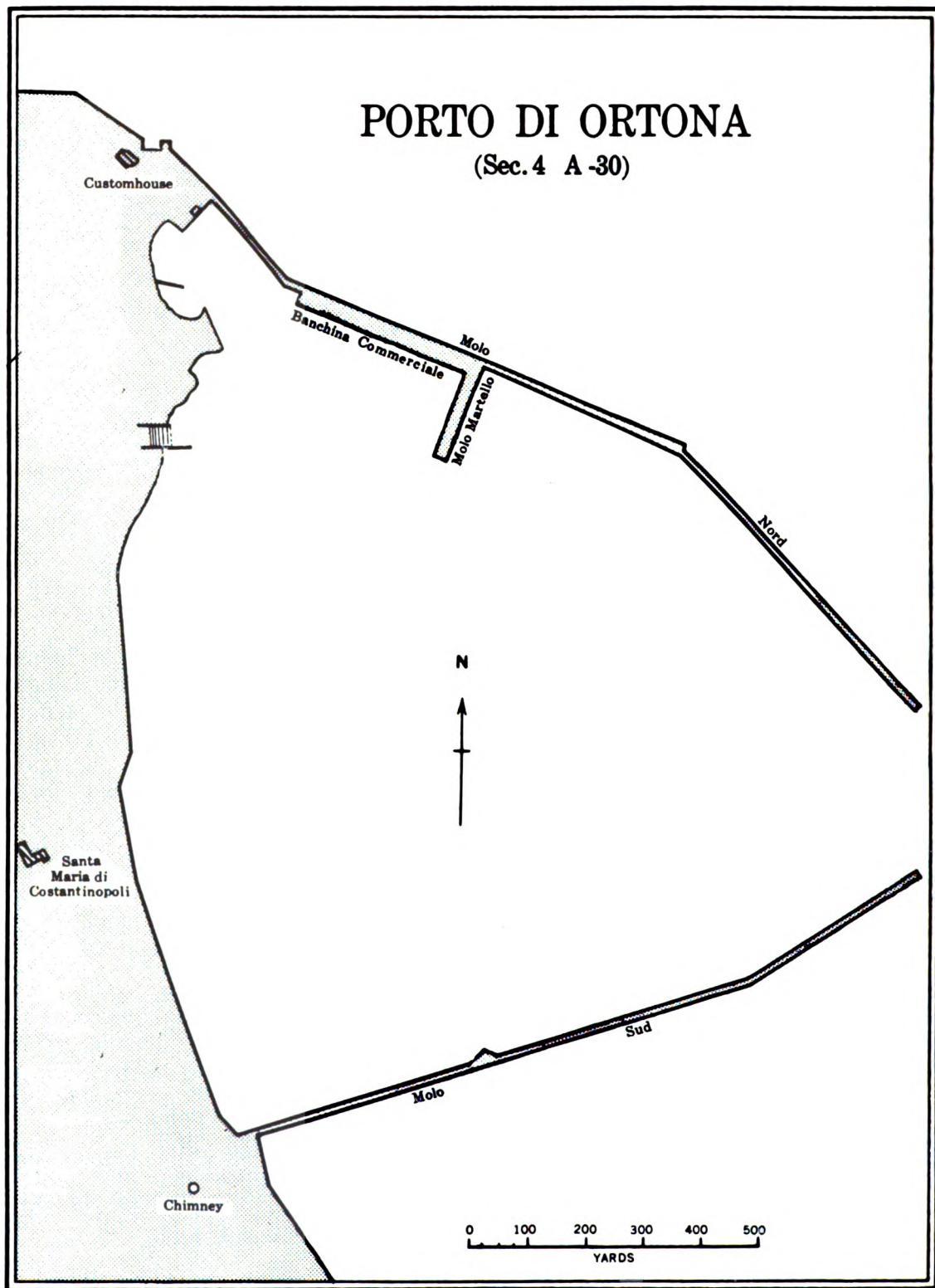
4A-30 FACILITIES.—Ortona, population about 9,000, stands on a small partially wooded yellowish promontory. The port has a small import and export trade.

Berthing space is available in the northwestern part of the harbor and on the western side of Molo Martello with about 16 feet alongside.

There is a small marine railway.

Fresh provisions are available in limited quantity. Water is laid on Molo Nord as far as Molo Martello. Railroad, telephone, and telegraph services are available.

There is a hospital in the town.



LANDMARKS—COASTAL FEATURES (Continued)

4A-31 From Ortona a high irregular COAST extends northwestward for 1 3/4 miles, whence it declines in elevation for 8 1/2 miles to the mouth of FIUME PESCARA. The mouth of FIUME ARIELLI, 2 1/2 miles northwestward of Ortona, is crossed by a conspicuous reddish concrete bridge with five arches. The town of San Silvestra stands on the flat summit of a hill about 1 mile from the sea and about 6 miles northwestward of Fiume Arielli; a radio tower, close eastward of the town, is very conspicuous and makes a good landmark.

PESCARA (42° 28' N., 14° 13' E.) consists of two communities standing on the banks of Fiume Pescara near the shore. PESCARA-PORTA NUOVA lies on the southeastern bank of the river about 1/2 mile inland and consists of numerous factories and whitish buildings. PESCARA-RIVIERA DI CASTELLAMARE with residential buildings and two prominent public edifices stands on the opposite side of the river on the beach. Two large steel bridges across the river and the radio tower of San Silvestra, showing obstruction lights, are prominent. A conspicuous tower stands 3/4 mile south-southeastward of the mouth of Fiume Pescara. A small port for shallow draft vessels is entered between two moles projecting from the mouth of the river. Each mole is marked near its head by a light. A fog signal is sounded from the head of the southeastern mole. Vessels up to 230 feet in length with a maximum draft of 12 feet are allowed to enter the port.

All vessels entering the port must pass at least 200 yards seaward of the head of the southeastern mole. Speed when entering or leaving must be slow. Only vessels of less than 50 tons may pass in the channel. Regulations are in force for vessels carrying petroleum.

The HARBOR is difficult to enter with northeasterly winds and requires constant dredging because of silt. Vessels with a draft of 13 feet or more anchor about 600 to 1500 yards north-northeastward of the moles and offload their cargo into barges. The banks of the river just inside the moles are quayed. Depths alongside the northern quay are about 3.4m (11 ft.) and up to 4.3m (14 ft.) alongside the southern quay. In 1966, there was a depth of 5m (16 ft.) in the entrance channel. Two spoil grounds lie about 1 mile northeastward and 2 miles north-northeastward, respectively, of Pescara. There is a hospital at Pescara.

The village of SILVI is situated close to the sea on the crest of a hill, 787 feet high, 8 miles northwestward of the mouth of Fiume Pescara, and at its foot on the shore are grouped the houses of its MARINA. TORRE DI CERREANO, 1 1/4 miles north-northwestward of Silvi, consists of a square embattled building with a set-back addition on top. A SIGNAL STATION available for public correspondence at all hours is located on the tower.

FIUME VOMANO empties into the sea through a broad fertile valley, about 4 1/2 miles north-northwestward of Torre di Cerrano, and is crossed near its mouth by a long concrete bridge with 19 arches.

GIULIANOVA is a town situated in part on the side of a hill, 200 feet high, and partly on the shore, 11 1/2 miles north-northwestward of Torre di Cerrano. Conspicuous in the town is a square with a statue and two churches. The depths in the small harbor, formed by two moles, are subject to change; the entrance and the area alongside Molo Nord are dredged periodically to about 4.3m (14 ft.). The heads of Molo Nord and Molo Sud are each marked by a light. Close northwestward of the head of Molo Nord; a new arm extending east-northeastward for about 100 yards was under construction (1966). The head of Molo Sud was partly demolished (1962). A LIGHT is shown on the extremity of the construction. The light is moved as work progresses. It is dangerous to enter the harbor with heavy seas caused by the northeasterly and easterly winds. A red BUOY marks a WRECK in the northwestern section of the harbor. There is a hospital in the town.

The mouth of FIUME TRONTO (42° 54' N., 13° 55' E.) is situated about 8 1/2 miles northward of Giulianova; a mole is on the south side of the entrance. A WRECK, with about 3m (10 ft.) over it, lies about 1/4 mile off the entrance of the river mouth. The remains of a mole, which dries, extends about 150 yards from the coast about 1/2 mile southward of the river mouth. The town of Colonnella is perched conspicuously on the top of a hill 994 feet high, about 3 miles inland on the southern side of the broad valley through which flows Fiume Tronto. Several small villages are located on the shore southward of the river mouth.

Two LIGHTS, vertically disposed, are shown at the entrance of the river.

4A-32 SAN BENEDETTO DEL TRONTO (42° 57' N., 13° 53' E.), situated 3 3/4 miles north-northwestward of the mouth of Fiume Tronto, is an active fishing town of about 23,250 population lying principally on the flat shore with some buildings on the hill slope and villas spreading southward. Conspicuous in the town are; a square campanile with a balcony atop, a clock tower, a water tank near the root of Molo Nord, a large yellow bathing pavilion on the beach, and southward of the town a large black cross on a little hill. The HARBOUR is formed by Molo Nord and Molo Sud with an entrance about 130 yards wide. Molo Nord projects in a general east-southeasterly direction and Molo Sud in a general northeasterly direction. An area southward of Molo Nord is dredged to a depth of 4m (13 ft.), but vessels can not approach the mole closer than 4.5m (15 ft.) because of bordering underwater rocks. The controlling depth over a sand shoal off the entrance is 3m (10 ft.) Several lights are shown within the harbor area, one on the head of Molo Nord, one on the head of Molo Sud, and one in the southwestern part of the harbor. A fog signal is sounded from the light structure on Molo Sud. ANCHORAGE is dangerous in the roadstead with winds from the northeast quadrant. With winds from the west the sea is always rough. The bottom is sand, good holding ground.

About 1 1/2 miles northward of San Benedetto del Tronto, TORRENTE TESINO flows through a broad fertile valley to its mouth where it is crossed by a large cement bridge with five arches, and near it are two tall cylindrical water filters. About 1 mile northward the village of GROTTAMMARE spreads along the beach and up the slope of a hill. Three groins are located southward of this village. One of the most conspicuous peaks along this coast is RIPATRANZONE, 1,667 feet high, situated 5 miles westward of Grottammare. There are three towers on its summit which from southeastward appears level but from northeastward appears uneven.

The village of PEDASO, 6 1/2 miles north-northwestward of Grottammare, lies amid trees on the southern bank of FIUME ASO which is crossed by a masonry bridge with six arches. Two short groins extend from the beach. A LIGHT is shown from a white

octagonal tower, adjacent to a house marked with the words "FARO PEDASO", situated about 1/2 mile southward of the village. A dangerous WRECK was reported (1965) to lie about 4 miles north-northeastward of the light structure.

4A-33 PORTO SAN GIORGIO, situated about 5 miles north-northwestward of Pedaso, is the port for Fermo and is a popular watering resort. Prominent in the village are; a fort, a square tower, several chimneys, and various colored villas on the beach including a large blue-colored building. A LIGHT is shown on the head of a pier about 1 mile southeastward of the village. FERMO, standing on a partially wooded hill, 1,047 feet high, about 3 1/2 miles west-southwestward of Porto San Giorgio, is conspicuous above the surrounding hills and is the best landmark in the vicinity; it is surmounted by a church with a large steeple.

The coast from Porto San Giorgio trends 8 miles north-northwestward to Porto Civitanova and contains a few small scattered villages. About 1 mile south-southeastward of Porto Civitanova, FIUME CHIANTI enters the sea from a broad valley and is crossed near its mouth by a bridge on cement piles. The village of MONTEGRANARO stands on a hill, 909 feet high, at the head of the valley and at its foot is the village of MACERATA.

MONTE SAN VICINO, situated 30 miles westward of Porto Civitanova has a trapezoidal-shaped peak and is one of the best landmarks visible from as far northward as Rimini.

4A-34 PORTO CIVITANOVA (43° 19' N., 13° 44' E.), population about 9,000, is built on a level beach 8 miles north-northwestward of Porto San Giorgio. It has an important fishing fleet. Conspicuous in the town are; a large palace and a square in the center of the town facing the sea, a water tank with an adjacent chimney, several campaniles, and at the southern extremity of the town a white building with many windows. A small fishing boat harbor with depths of 3.4m (11 1/2 ft.) to 4m (13 ft.) is formed by moles. A light is shown on the head of the northern mole; a radiobeacon transmits at the light. A Fog Signal is sounded. A light is shown from the church tower of Chiesa di Cristo Re in Porto Civitanova. A small pier extends off the town. Vessels can anchor in 10.2m (5 1/2 fm) sand, about 1 mile offshore, or in about 4.4m (2 1/4 fm), sand, nearly 1/4 mile from

shore; the holding ground is only fair. The town of Civitanova, situated on a hill, 509 feet high, 2 miles northwestward of the port, has three conspicuous campaniles and a square tower.

Porto Recanti.—The coast from Porto Civitanova trends 8 miles north-northwestward to Porto Recanti and contains several streams and small villages. The port is situated at the foot of a hill between the railway and the sea. An ancient square tower, a chimney, and cement works are prominent southward of the village. The town of Recanti with a palace of many windows spreads out on a flat-topped hill, 961 feet high, about 5 miles west-southwestward of the port. The

town of Loreto with a prominent dome and campanile is conspicuous on a hill, 417 feet high, 2½ miles westward of Porto Recanti. A short pier extends about 55 yards from the beach. A light is shown from a short tower on a hut, both of dark color, situated on the beach.

Several wrecks lie in the approach to the port. Two wrecks lie as far as 4 miles northeastward of the port.

4A-35 Headland of Monte Conero.—From Porto Recanti, the coast trends north-northwestward about 7 miles to Punta Mezzaluna, the eastern extremity of a conspicuous headland rising precipitously to Monte

Conero, whose peak is 1,877 feet high. A range of hills extends northwestward from Monte Conero decreasing in elevation to the northern end of Promontorio di Ancona, 6 miles northwestward. Between Porto Recanti and the village of Numana, 5 miles north-northwestward, the valley of Fiume Musone slopes into the sea. Numana is divided into two parts by a small point of land on which stands a tower resembling an isolated arch. The village of Sirola stands on a bluff $\frac{3}{4}$ mile northward of Numana; its whitish houses are partly obscured by trees. On the rounded and dark-colored summit of Monte Conero stands a conspicuous abandoned signal station, and $\frac{1}{2}$ mile southeastward stands an abandoned convent. Monte Conero, which has bare whitish sides, particularly the eastern, is an excellent landmark. A dangerous wreck lies sunk about 2 $\frac{1}{2}$ miles eastward of Numana.

Scogli Le Due Sorelle, two conical rocks lying close eastward of Punta Mezzaluna, are prominently visible from southeastward and northwestward.

Porto Nuovo is a slightly indented sandy bay about 1 mile wide between the headland of Monte Conero and Promontorio di Ancona. Its southeastern entrance point, on which stands a grayish square tower, lies 2 miles northwestward of Punta Mezzaluna. The point is closely fronted by two detached groups of rocks. A church with two adjacent houses is situated on the shore 680 yards southeastward of the tower. The northwestern entrance point consists of Scogliera Trave, a natural rocky mole about 625 yards long, extending east-southeastward from the northwestern side of the bay. A reef continues from the head of the mole in the same direction for 550 yards.

There is a good anchorage in 22 feet of water within a radius of 250 yards from a position with Montirozzo, a hill 590 feet high on the western shore, bearing 256°, and the square tower in line with the church south-eastward bearing about 134°. A depth of 39

feet within the same radius exists from a position with Montirozzo bearing as before and the square tower bearing 180°.

ANCHORAGES

4A-36 Vieste.—In 6 fathoms about 700 yards eastward of the southern extremity of Scoglio Santa Croce. Large vessels should anchor farther offshore. Small vessels can anchor, according to the wind, either southward of the convent on Punta San Francesco, or westward of Punta Santa Croce. (See sec. 4A-1.)

Rodi Garganico.—In 3 $\frac{1}{4}$ fathoms about 1,300 yards offshore with the head of the mole bearing about 180°. (See sec. 4A-5.)

Isole Tremiti.—See section 4A-12.

Fiume Fortore.—In 9 fathoms over sand a little over 1 mile northward of the river mouth. During easterly and southeasterly winds this is considered one of the best anchorages southward of Ancona. (See sec. 4A-18.)

Termoli.—See section 4A-19.

Torre Petacciato.—In 7 $\frac{1}{2}$ fathoms over good holding sand about 1 $\frac{1}{2}$ miles northward of the tower. This anchorage is preferred to that at Termoli because, generally there is less of a sea. Torre Petacciato is a thick square whitish tower on a slope above the beach 5 miles west-northwestward of Termoli. (See sec. 4A-20.)

Vasto.—In 7 fathoms over fair holding ground 3 miles northeastward of the town which lies at an elevation about $\frac{3}{4}$ mile north-northeastward of Vasto Marina. Another place used is in 4 fathoms in the vicinity of Vasto Marina, a little over 1 mile offshore. The bottom towards Punta Penna is mud and has better holding properties. (See sec. 4A-20.)

Porto Ortona.—See section 4A-26.

Pescara.—In 6 to 8 fathoms over good holding mud about 1 $\frac{1}{2}$ miles off the mouth

of Fiume Pescara, or in 9 to 10 fathoms 1 mile farther offshore. (See sec. 4A-31.)

San Benedetto del Tronto.—In from 5½ to 7 fathoms over good holding sand between 1,600 and 2,000 yards offshore of the village. (See sec. 4A-32.)

Porto Civitanova.—In 5½ fathoms over good holding ground about 1 mile off the port. (See sec. 4A-34.)

Porto Recanti.—In depth desired with good holding ground prevailing everywhere. Steamers usually anchor about 750 yards off the pier. (See sec. 4A-34.)

Porto Nuovo.—See section 4A-35.

PART B. PROMONTORIO DI ANCONA TO DELTA OF FIUME PO

4B-1 Promontorio di Ancona (43°38' N., 13°31' E.), the northern extremity of which lies 7 miles northwestward of Punta Mezzaluna, is a headland extending northward from the general trend of the coast. It is separated from the headland of Monte Conero by Porto Nuovo. A range of hills, decreasing in elevation northwestward, extends between Monte Conero and Monte Guasco, the northernmost elevated extremity of Promontorio di Ancona. Porto di Ancona is situated on the western side of the promontory.

COAST—GENERAL

4B-2 Between Promontorio di Ancona and the delta of Fiume Po the coast trends northwestward and then northward for a distance of 85 miles. Between the promontory and Rimini, a city 50 miles northwestward, the hills backing the coast are still in evidence, but northward of Rimini the land is low and sandy, continuing as such to Fiume Po. Between Rimini and Cervia, 16 miles northwestward, there are several villages situated on the large cultivated plain; northward of Cervia the coast is marshy.

The rivers and streams northwestward of

Promontorio di Ancona bring large alluvial deposits down to the sea, producing a gradual extension of land seaward and forming irregular and extensive shoaling. Where the land is high, rocks border the shore in places.

DANGERS

4B-3 Shoal water bordering the coast between Promontorio di Ancona and the delta of Fiume Po extends somewhat farther offshore than that to southward, but the depths shoal gradually shoreward, and there are no off-lying dangers. Between the promontory and the town of Cattolica, 40 miles northwestward, the 6-fathom curve lies about 2 miles offshore, but between the latter and the delta of Fiume Po it lies up to about 4 miles offshore.

A dangerous wreck lies about 2 miles east-southeastward of Scoglio Volpe (sec. 4B-6).

NAVIGATION

4B-4 Along coast.—This coast may be navigated safely by remaining outside the 6-fathom curve. See DANGERS above.

To delta of Fiume Po.—From a position 5 miles northeastward of Promontorio di Ancona, a course of 332.5° for 86 miles leads to a position 6 miles eastward of Punta della Maestra Lighthouse. See caution in section 5A-5.

PORTO DI ANCONA

Position: 43°37' N., 13°30' E.

Depths:

Roads, 7 fathoms.

Entrance, 33 feet.

Northwestern part of harbor, 29½ feet.

Quays, 5 to 33 feet.

Tide: Diurnal range, 1 foot; maximum range, 1.9 feet.

Port plan: Section 4B-16.

4B-5 Porto di Ancona is a small but well protected harbor situated directly westward of Promontorio di Ancona. The harbor, which is formed between two moles, is substantially circular and about ½ mile in dia-

meter. It is extensively quayed and the largest vessel that can be accommodated is about 650 feet long with a draft of 28 feet. The city lies chiefly eastward of the harbor.

A shipyard with a small craft basin occupies an area northward of the harbor at the extreme northern end of Promontorio di Ancona.

DANGERS

4B-6 Scoglio Volpe, with less than 3 fathoms over it, extends about 300 yards north-northwestward from the northern end of the shipyard. A breakwater projects about 200 yards northwestward from the shore in this vicinity.

See section 4B-17 for a dangerous wreck in the approach to the port.

NAVIGATION

4B-7 Northbound.—From a position on the coastal track eastward of Promontorio di Ancona, vessels may close the coast to pass about 2 miles northward of Ancona Lighthouse on Colle dei Cappuccini, a hill near the northern end of the promontory, whence directions for entering may be followed.

Southbound.—The following courses for southbound vessels from the positions indicated will lead to a position 0.5 mile northwestward of the head of Molo Foraneo Nord:

From close off Pličina Albanež (Secca Pericolosa) Lighthouse (sec. 6B-7), 195° for 69 miles.

From a position 6 miles westward of Hrid Sveti Ivan (Scoglio San Giovanni in Pelago) Lighthouse (sec. 6B-24), 180° for 84 miles.

From the entrance of Porto di Lido (Venice) (sec. 5B-26), 158° for 115 miles.

Caution.—Vessels approaching from northward during poor visibility will find that the 5½-fathom curve leads to the port, whereas vessels from southward should not close the land inside the 11-fathom curve until a reliable position is obtained.

CURRENT, WIND, AND TIDE

4B-8 Currents.—The coastal current has

a general southeasterly set. A branch from the main current passes approximately 300 yards offshore, touching the outer end of Molo Foraneo Sud, thence crossing the entrance channel, and thence passing over Scoglio Volpe where it turns away from the coast and rejoins the main current. The drift of this current is usually about 4 miles in 24 hours. However, during strong northwesterly and north-northwesterly winds the current may reach a velocity of 2½ knots, which endangers the maneuverability of vessels entering the harbor; the main current about 7 miles offshore may reach a velocity of about 3 to 3½ knots.

A portion of these fast currents striking Molo Foraneo Nord is diverted into the port and makes ship handling dangerous in the vicinity of Molo Nord and Molo Clementino.

Winds.—In winter, the prevailing winds are from the westward and northwestward, but fresh easterly winds blow frequently. Dense fogs accompanied by a calm occur in winter. The northeasterly wind is usually forecast by the accumulation of clouds on the surrounding mountains of Ancona. In summer, westerly winds prevail in the forenoon and southeasterly later in the day. Clouds covering Monte Conero usually indicate southeasterly winds with rain and heavy weather.

Tide.—The high-water interval is 10 h. 28 m. The maximum range is 1.9 feet. The bora has been known to increase the height of the water by more than 3 feet.

DEPTHS

4B-9 A depth of 7 fathoms is found in the roads, 33 feet in the entrance, and 29½ feet in the harbor northwestward of a line extending from the eastern protruding point of Molo Sud to the southwestern corner of Pontile Tropezoidale. The harbor is subject to silting and is dredged periodically.

LANDMARKS

4B-10 Monte Conero, surmounted with a signal tower and convent, is the most con-

spicuous landmark to be seen from any direction. See caution regarding similarity of appearance of Monte Ardizio (sec. 4B-18). In clear weather, Monte San Vicino (sec. 4A-33), situated 27 miles southwestward of Ancona, is a good landmark from the offing.

From closer inshore, particularly from northwestward, the city appears built on sloping land in the form of an amphitheater below three hills; Monte Guasco to northward on which stands the cathedral of San Ciriaco with a detached campanile and a conspicuous dome; Colle dei Cappuccini, close southeastward, supporting the lighthouse and signal station; and Monte Astagno, $\frac{3}{4}$ mile southward, on which a large citadel is located. From a position still closer, the head of Molo Nord and prominent buildings in the city will be seen.

ANCHORAGE

4B-11 Two anchorages are located outside the harbor. One is to the northward of Molo Nord in depths of 7 $\frac{2}{3}$ to 8 $\frac{1}{6}$ fathoms, and affords protection from westerly to southwesterly winds but is untenable in northerly or easterly winds; the holding ground is fair, the bottom being of hard sand. The second anchorage is southward of Molo Foraneo Sud with a maximum depth of 4 $\frac{5}{6}$ fathoms, but affords better holding ground than the northern anchorage. The inner harbor can afford anchorage to three vessels of the Liberty type, and one at a Mediterranean moor in an emergency only. Two mooring buoys are available, one in the outer part and the other in the inner part of the harbor.

HARBOR

4B-12 The harbor is protected to northward by a three-sectioned mole, about 1,130 yards long, projecting westward from the northwestern extremity of Promontorio di Ancona. Molo Clementino is the inner section; Molo Nord, the center; and Molo Foraneo Nord, the outer.

Molo Sud, broadly quayed for the most part, extends with three knuckles in a general north-northwesterly direction for about 1,080 yards from a position 550 yards westward of the citadel. Molo Foraneo Sud extends about 400 yards northwestward from a position about 200 yards southward of the head of Molo Sud. Two short breakwaters extend toward each other, one from the head of Molo Sud, and the other from the junction of the inner and center sections of the northern mole, providing an entrance 175 yards wide.

Three broad wharves extend into the harbor from the northeastern part of the city, forming three basins, the names, position, berths, and dimensions of which can be understood best by regarding the port plan. A shallow harbor is formed southwestward of the town by a mole which extends about 850 yards southwestward from Molo Sud and a rubble breakwater. In 1964, the area between the mole breakwater and shore was being reclaimed.

An offshore oil terminal, consisting of a framework tower with hoses, and dolphins on each side, lies about 275 yards west-southwestward of the head of Molo Foraneo Sud. A submarine pipeline connects it to the shore. Three mooring buoys are positioned in the vicinity.

A signal station, consisting of a gray square tower stands on Colle dei Cappuccini near the lighthouse. Storm signals are displayed at the station. (See sec. 1-11.)

LIGHTS

4B-13 Ancona Light is shown on Colle dei Cappuccini, about $\frac{1}{3}$ mile southeastward of the extremity of Promontorio di Ancona; this light often cannot be seen in hazy weather.

The heads of Molo Foraneo Nord and Molo Foraneo Sud are each marked by a light. The head of the short rock spur which extends southward from the head of Molo Nord is marked by a light. Also, the heads of the northern and southern breakwaters are each marked by a light. A light is shown from the oil terminal tower.

The lights along the coastal road connecting Ancona with Falcona Marittima, about $5\frac{1}{2}$ miles westward, are very conspicuous at night.

A nautophone fog signal is sounded at the light structure on the head of Molo Foraneo Nord.

PILOTAGE

4B-14 Pilotage is compulsory for vessels over 500 tons, and 24-hour service is available. During fair weather pilots will board ships outside the entrance between the heads of the outer moles, but during strong northerly winds vessels will be met inside the entrance.

DIRECTIONS FOR ENTERING

4B-15 Vessels should approach the head of Molo Foraneo Nord on a bearing not over 227° to clear the reef surrounding Scoglio Volpe. Mariners are cautioned regarding the current onto Molo Foraneo, Molo Nord, and Molo Clemantino.

FACILITIES

4B-16 Ancona is built in the form of an amphitheater on the slopes of three hills; Monte Guasco to northward on which stands the cathedral of San Ciriaco; Colle dei Cappuccini, southeastward of the former; and Monte Astagno to southward surmounted by the citadel.

The population was about 89,000 in 1962.

The principal trade consists of the importation of coal, phosphates, jute, pyrites, and lumber. Exports are agricultural products, asphalt rock, sulphur, and refined sugar.

Berths.—The usable length and alongside depths of the various berths in 1960 were as follows: (Berth numbers are for reference to the port plan only.)

Berth	Usable length (feet)	Depth
Molo Foraneo		
Nord	850	10m (33 ft.)
Molo Nord	600	2.7m (9 ft.)
1	950	9.1m (30 ft.)
2	500	7.9m (26 ft.)
3	365	7.9m (26 ft.)
4	510	7.9m (26 ft.)
5	700	5.8m (19 ft.) to 7m (23 ft.)
6	320	5.5m (18 ft.)
7	320	6.4m (21 ft.)
8	395	5.8m (19 ft.)
9	400	7.3m (24 ft.)
10	430	5.2m (17 ft.) to 6.1m (20 ft.)
11	480	Foul
12	225	6.7m (22 ft.)
13	335	6.7m (22 ft.)
14	245	5.5m (18 ft.)
15	915	1.8m (6 ft.) to 3m (10 ft.)
16	340	3.6m (12 ft.)
17	750	1.5m (5 ft.) to 1.8m (6 ft.)
18	480	2.1m (7 ft.)
19, 20,		
21, 22	1810	4.9m (16 ft.) to 7.9m (26 ft.)

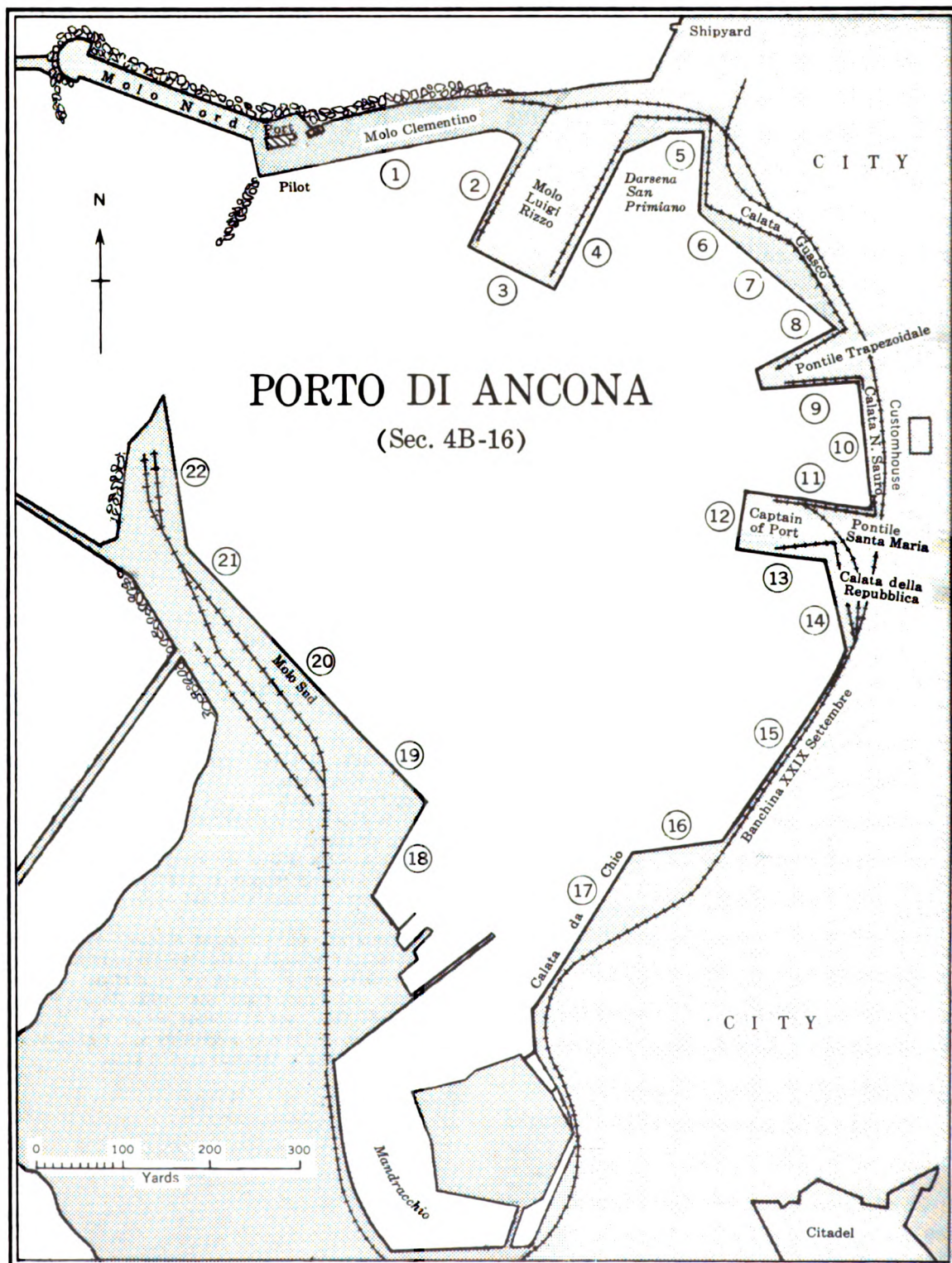
Tugs, several shore cranes, and a 50-ton floating crane are available.

Supplies.—Fresh provisions are plentiful and water is piped to the berths. Fuel oil and diesel oil may be obtained.

Repairs.—Facilities are available for all types of hull or machinery repairs to vessels afloat. The largest slipway can take a vessel up to 500 tons. Divers are available.

Communications.—Regular steamer communication is maintained with the principal ports in the Adriatic and Mediterranean. There is a station on coastal railway, and direct connection with Rome. There are radio, telegraph, and telephone services.

Hospitals.—There is a military and a civil hospital, the latter having a capacity of 650 beds.



LANDMARKS—COASTAL FEATURES NORTHWARD OF ANCONA

4B-17 The coast forms a small bay southwestward of Ancona, whence it continues northwestward for 13 miles to Senigallia. The water shoals uniformly shoreward, the 6-fathom curve lying $1\frac{1}{2}$ miles offshore.

A dangerous wreck, the existence of which is doubtful, is charted about $5\frac{1}{2}$ miles north-northeastward of Falconara Marina.

Falconara Marina, situated on the shore at the foot of a hill about 5 miles westward of Ancona, has a prominent white railway station and a red church with a campanile. Two conspicuous white roads ascending to Falconara Alta, $\frac{1}{2}$ mile southward straddle the marina.

At **Falconara Marittima**, $\frac{1}{2}$ mile north-westward of Falconara Marina, a cement pier extends 1,360 yards northeastward. Several mooring buoys are located off the head of this pier for securing vessels discharging oil at the pier. Vessels drawing up to 27½ feet can be accommodated; length is not a limiting factor. Vessels with greater drafts may be lightered in Ancona roads by barges. It was reported (1964) that strong currents in the vicinity of the pier may, at times, force vessels to leave the berth and anchor in the roads. A berth for vessels with drafts not over 19 to 20 feet is on the eastern side of the pier about 328 yards from its head. Two small vessels can moor to the pier with the aid of mooring buoys. Lights are shown from a hut on the head of the pier. A dangerous wreck lies about 1 mile east-northeastward of the head of the pier. A prohibited area, which comprises a submerged pipeline terminal, has its southeastern boundary extending along the oil pier to a position about $1\frac{1}{2}$ miles northeastward of the head of the pier; its northwestern boundary extends northeastward from the shore about $\frac{3}{4}$ mile northwestward from the root of the pier. The berth will accommodate a tanker 680 feet long with a 33-foot draft. Water is piped to the pier; fuel oil and diesel oil can be supplied.

Several mooring buoys and two buoys, each with a radar reflector, are moored in the vicinity of the terminal. Buoys marking the pipeline are positioned about $\frac{1}{3}$ mile and

$\frac{1}{2}$ mile north-northwestward, $\frac{1}{2}$ mile west-northwestward and $\frac{3}{5}$ mile westward, respectively, of the terminal.

A light is shown on the terminal of the submerged pipeline. A fog signal is sounded at this light.

All vessels bound for Falconara Marittima must anchor outside Ancona harbor to await pratique and a pilot.

Fiume Esino discharges into the sea through a valley about 1 mile westward of the pier at Falconara Marittima and is crossed near its mouth by a large bridge with many arches which is partially concealed by verdure.

The town of **Montignano** stands prominently on a hill, 325 feet high, about $\frac{1}{2}$ mile inland and 4 miles west-northwestward of the mouth of Fiume Esino. **Torre Albani**, plainly seen from any direction, stands on a hill, 367 feet high, $\frac{3}{4}$ mile northwestward of Montignano. When bearing about 215° , this tower appears to be connected to the shore by a steep white road.

Senigallia ($43^\circ 43' N.$, $13^\circ 13' E.$), a watering resort with considerable import and export trade, is situated at the mouth of Fiume Misa, 14 miles west-northwestward of Ancona. The harbor is entered between two moles extending about 220 yards northeastward from the sides of the river mouth. The banks of the river are quayed for a distance of about $\frac{1}{2}$ mile, as are two communicating basins. In 1960 the depths ranged from 9 feet in the entrance to 6 feet and less in the basins. The harbor is subject to a violent rise of the river which causes considerable change to the harbor itself and the entrance bar. A depth of $9\frac{1}{4}$ feet is maintained by annual dredging. A 500 ton marine railway is available.

The most conspicuous of several prominent buildings is **Albergo Bagnik**, a large gray-colored bathing pavillion situated near the beach southward of the moles. A light is shown near the head of each mole, and from a position at the root of the eastern mole. A fog signal is sounded at the head of the eastern mole. A radiobeacon transmits from a mast located at the root of the eastern

mole. Anchorage may be taken anywhere in the depth desired. At a distance of about $1\frac{1}{2}$ miles with the mole heads bearing about 204° a depth of 5 fathoms over sand will be found. Better holding ground of mud will be found seaward of the 6-fathom curve. Anchorage in the roadstead is dangerous with winds from the northeast quadrant. Deratting can be carried out and Deratting Certificates and Deratting Exemption Certificates issued. A civil hospital is available.

4B-18 The coast from Senigallia trends 12 miles northwestward to Fano and consists of a series of hills, densely covered with vegetation, and dotted with numerous houses and villages. Fiume Cesano is crossed at its mouth, 3 miles northwestward of Senigallia, by a bridge with 14 arches, and 7 miles farther northwestward Fiume Metauro is traversed by two bridges. The seaward bridge has 18 arches and the inner one has large conspicuous white piles. In clear weather the sinuous dorsal ridge of Monti di Catria, 5,584 feet high, may be seen to rise about 27 miles southwestward of Senigallia.

Fano ($43^\circ 51' N.$, $15^\circ 01' E.$), a town of about 36,329 population and with an aspect from seaward of a large city, is situated at the mouth of Canale Albani, a branch of Fiume Metauro, 12 miles northwestward of Senigallia. Conspicuous are: a convent with a campanile atop Monte Giove, 732 feet high, 2 miles southwestward of the town; a large white bathing pavilion near the beach at the northwestern side of the town; and a tower on a brown fort near the center of the town. A small basin, about 130 yards in diameter, is formed by two moles extending irregularly northward from the sides of the mouth of Canale Albani. A short mole in the basin forms two smaller basins. In 1962 there was 8 feet in the entrance channel.

Fano Light is shown about $\frac{1}{2}$ mile southward of the entrance between the moles. A light is shown, respectively, from the head of the eastern and western moles, and two lights vertically disposed are on the head of the internal mole; a fog signal is sounded at the light on the eastern mole. A light is shown close northwestward of the swing bridge that crosses the canal about $\frac{1}{3}$ mile southward of the entrance.

A dangerous wreck lies about 2 miles eastward of Fano Light structure.

Vessels can anchor in 6 fathoms, mud, good holding ground, about $1\frac{1}{2}$ miles offshore.

Vessels should not enter the harbor without local knowledge as it is subject to silting, and shifting banks, with as little as 4 feet over them, sometimes form about 200 yards off the entrance. A civil and a military hospital are available.

Between Fano and Pesaro, 6 miles northwestward, the relatively high coast is dominated slightly by Monte Giove (see above) and Monte Novilara, 705 feet high, standing 2 miles inland and about $3\frac{1}{2}$ miles west-northwestward of Fano. On the summit of the latter there is a dark-colored village with a tower. Monte Ardizio, 463 feet high, dark and steep-sided, rises close to the coast 1 mile southeastward of Pesaro. This mountain slopes steeply to the sea and decreases in height northwestward, greatly resembling Monte Conero (sec. 4A-35), although of lesser height. Mariners are cautioned that in reduced visibility it can be mistaken for the latter.

Pesaro ($43^\circ 55' N.$, $12^\circ 54' E.$), a prominent coastal town of about 50,000 population, is situated on the eastern bank of the mouth of Fiume Foglia, between Monte Ardizio to southeastward and Monte San Bartolo to northwestward, and about 6 miles northwestward of Fano. Conspicuous are: a large white two-storied building with two similar turrets located at the foot of Monte Ardizio; a church cupola in the center of the town; and a bathing pavilion surrounded by small dwellings on the beach at the southeastern part of the town. A harbor, with a depth of about 11 feet, is between Fiume Foglia and the town; it is entered between two moles extending about 230 yards north-northeastward from the shore. Vessels up to 196 feet long with a maximum draft of 10 feet are allowed to enter the harbor. There are three basins which are quayed, as is the eastern mole. A light is shown from the head of the eastern and western moles. A fog signal is sounded from the light structure on the head of the eastern mole. A 1000-ton capacity

marine railway, 265 feet long and 165 feet wide, is located in one of the basins. Monet San Bartolo Light is on the former signal station atop Monte San Bartolo. Several rocks with a depth of less than 1.8m (6 ft.) lie on shoals extending about 450 yards off the entrance, which should not be attempted without local knowledge. Craft mooring alongside the quays should proceed with caution as parts of the old quay wall still lie submerged adjacent to the new walls. Craft entering or leaving the harbor should not proceed at a speed greater than 5 knots, except under special circumstances.

4B-19 Between Pesaro and Rimini, 17 miles northwestward, the coast is intersected by many streams. For a distance of 6 miles northwestward of Pesaro, as far as the village of Gabicce, situated on a hill 472 feet high, the coast consists of cultivated hills, whereas westward the hills are lower. From a position about 1 mile eastward of Gabicce the coast trends about 3 miles westward forming a bight.

Cattolica, a village of about 5,000 population, lies about 500 yards inland and about 1 mile westward of Gabicce. Prominent in the village are a yellowish tower, a white church, and a blue-colored fish market, while westward of the city a group of hotels parallel to the beach are very conspicuous. At the western extremity of the group of hotels are the buildings of a beach resort. A shallow harbor with a depth of less than 2.4m (8 ft.) is entered between two small moles extending a short distance northward from Torrente Tavallo. Some rocks with depths of less than 1.8m (6 ft.) exist about 500 yards eastward of the channel entrance. A light is shown on the head of the eastern mole; a fog signal is sounded from this light. A light is shown from the head of the western mole. A light is shown at the root of the eastern mole.

A dangerous wreck lies sunk about 4 miles northwestward of the light on the eastern mole.

A groin extends seaward about 100 yards from the western side of the mouth of Fiume Conca, about 1 mile westward of Cattolico. The sprawling village of Riccione, situated about 4½ miles west-northwestward of Cattolico, has a tree-hidden part and another comprising villas on the beach. Canale di Riccione, a small craft harbor with shallow depth, is entered between two short moles at the mouth of Rio Maranello close northwestward of Riccione. A light is shown from a post on the head of the eastern mole. The large grayish building of the Grand Hotel is conspicuous about ½ mile southeastward of the small craft harbor entrance. A high isolated chimney stands near the entrance of the harbor.

An aviation light is shown at an airport about 2 miles west-northwestward of Canale di Riccione.

The mouth of Rio Marano, about 1½ miles northwestward of Canale di Riccione, is crossed by a bridge.

4B-20 Porto di Rimini (44°04'N., 12°35'E.), situated 10 miles northwestward of Cattolica, consists of the quayed banks of Fiume Marecchia and is entered between two moles extending northward from the shore. Depths in the entrance and the river are variable, but the average is about 2.9m (9¾ ft.), which is maintained by dredging. The current during floods, which occur often unexpectedly, is extremely strong. The city at Rimini, about 77,163 population, is situated on the southeastern bank of Fiume Marecchia at the foot of wooded hills and about 1 mile from the sea. Aspects visible from sea include a conspicuous tall building about 1½ mile southward of Rimini light, a seaside garden, villas and a large bathing pavilion. The garden, villas, and pavilion are brightly illuminated during the summer until midnight. Approaching in clear weather from a distance, vessels will sight Monti di Cargegna, 4,642 feet high, with a nearly flat summit, situated about 20 miles southwestward of the entrance. Monte San Marino, 2,438 feet high, located 9 miles southwestward of the city can be distinguished by its height and by the three towers on its summit. The

latter in line with Moni di Carpegna lead approximately to the entrance of the port.

Rimini Light is shown from a tower on the eastern river bank nearly 600 yards southward of the entrance.

A light is shown from the head of each entrance mole. A fog signal is sounded from the eastern mole. Storm signals are shown from a mast on a low building near the root of the eastern mole. A hospital is in the town.

Anchorage in 9.2m (5 fm) over good holding mud exists between 1 and 2 miles northeastward of the head of and in line with the eastern mole.

The current in the vicinity of the port sets southeastward at an average velocity of 1 knot, but it is reported that with strong northwesterly winds in winter the velocity may reach 5 knots.

Between Porto di Rimini and Cesenatico, 11 miles northwestward, the coast is low and sandy, and is backed by higher, cultivated land. From about Porto di Rimini to Fiume Po the shore is fronted by a wide shoal, uniformly decreasing in depth. The 6-fathom curve lies about 4 miles offshore while at the beach obstructing shoals have been formed by the numerous streams entering the sea in this locality.

About 6 1/2 miles northeastward of Rimini Light lies an obstruction, a collapsed derrick, marked by three buoys.

Immediately northwestward of Rimini the sprawling village of Viserba extends for about 1 1/2 miles along the beach which is protected by numerous groins.

The village of Bellaria lies at the mouth and northward of Fiume Uso, the Rubicon of Roman history, 6 miles northwestward of Porto di Rimini. A small harbor with shallow depths exists in the river between two short moles.

Numerous oil rigs, some up to 12 1/2 miles offshore, are in the area from about 6 miles north of Porto di Rimini to Porto Corsini; many show lights and sound fog signals.

About 2 miles northwestward of Bellaria the mouth of Fiume Pisciatello appears as a blackish interruption of the uniformly white line of the shore, and is crossed by a concrete bridge with nine arches.

An aviation light is shown at Rocca delle Caminate, 1,083 feet high, about 25 miles westward of Rimini, and is clearly visible from seaward in fair weather.

4B-21 Cesenatico (44°12' N., 12°24' E.), situated 10 1/2 miles northwestward of Porto di Rimini, has a population of about 13,000 and is principally a fishing town and water resort. Conspicuous from a distance are: Monti di Carpegna and Monte San Marino, described in section 4B-20; and the double hill of Bertinoro and Cappuccini crowned with a prominent convent, 10 1/2 miles west-southwestward of Cesenatico. From a closer inshore position will be seen a water tower, an isolated reddish building to northward of the town, a yellow modern building to southward, and farther southward a water tank on concrete legs. A square white skyscraper, about 407 feet high, is located about 1/2 mile southward of the port entrance.

The harbor is provided by a basin and a channel entered between two short moles extending northeastward from the shore of the town.

The depth varies from 2.4m (8 ft.) to 4.9m (16 ft.) depending on the dredging programs.

Cesenatico Light is shown from a white cylindrical tower at the root of the southeastern mole; a light is also shown on the molehead and a fog signal is sounded. A light is shown from the head of the northwestern mole.

A submarine pipeline extends about 220 yards offshore from about 2 miles southeastward of the port.

A lighted oil drilling platform is about 4 miles east-northeastward of Cesenatico. A fog signal is sounded at the platform. A lighted oil well platform is about 12 miles east-northeastward of Cesenatico.

A wreck, with a depth of 7.6m (25 ft.) lies about 6 3/4 miles east-northeastward of Cesenatico Light.

The entrance is encumbered by a sand shoal and should not be attempted without local knowledge.

The village of Cervia, situated about 4 miles north-northwestward of Cesenatico and at the southern extremity of an extensive pine forest, is a noted watering resort. The principal industry is the extraction of salt from the neighboring marshes. There is a prominent campanile in the town slightly inland, and overlooking the beach is a large yellow four-storied hotel with a terrace. A small harbor with a depth of about 1.8m (6 ft.) is entered between two moles extending briefly northeastward from the shore. A light is shown from close southwestward of the head of the southern mole. A light is shown from the head of the northern and southern moles. A fog signal is sounded at the light on the head of the southern mole. Anchorage over good holding mud, northeastward of the village may be taken in the depth desired up to a distance of 5 miles offshore.

Between Cervia and Porto Corsini, 14 miles north-northwestward, the shore is low, sandy, interspersed with marshes, and backed by the pine forest previously mentioned. The high land bordering the coast nearer Ancona disappears northward of Cervia, nor are the Apennines any longer seen a short distance inland. Several rivers empty into the sea along this stretch of coast, two of them forming projections of land at their mouths, Fiume Savio, 3½ miles northward of Cervia, and Fiumi Ronco and Montone which join and form Fiume Unito, 5 miles farther northward. Deposit from these streams forms a bordering shoal with depths of less than 5.5m (3 fm) extending about 1 mile offshore.

Three light beacons, marking a shallow channel along the coast, are located about 3 1/2 and 7 1/4 miles northward of the mouth of Fiume Savio.

A small artificial "island" supported on a number of steel piles lies off the coast about 3½ miles east-southeastward of the entrance of Porto Corsini. Submerged pipelines extend from the shore to the island are marked by flags and lights. Several mooring buoys are positioned in the vicinity of the terminal.

The depth in the area is about 11m (36 ft.). For the details of the navigational aids on and around this structure, see section 4B-28. A rectangular cable area, about 1¼ miles wide and 7 miles long, extends from the shore in an east-northeasterly direction close southward of the artificial island.

A rectangular prohibited anchoring and fishing area, about 3/4 mile wide and 5 miles long, originating 3 1/2 miles northward from Porto Corsini extends in a south-easterly direction from the shore. Transit is prohibited in the outer 1/5 of this area due to the presence of drilling platforms and underwater obstructions.

This stretch of coast lacks prominent landmarks from any reasonable distance offshore, and mariners must rely, in clear weather, on bearings of the double hill of Bertinoro and Cappuccini, described in section 4B-21.

PORTO CORSINI AND PORTO DI RAVENNA

Position: Entrance, 44°29'N., 12°17'E.

Depths:

Entrance channel, 5.2m (17 ft.) to 6.4m (21 ft.).

Canale Corsini, 5.5m (18 ft.).

Porto di Ravenna, 5.5m (18 ft.).

Tide: Mean range, 1.7 feet.

Port plan: Porto di Ravenna, Section 4B-30.

4B-22 Porto Corsini (ex-Marina di Ravenna), situated midway between Ancona and Venezia, is the entrance to Porto di Ravenna, 6 miles southwestward, to which it is connected by Canale Corsini (Candiano).

4B-23 Navigation—Northbound.—From a position 5 miles northeastward of Promontorio di Ancona, a course of 317° for 68 1/2 miles leads to a position about 5 miles from the offshore end of the submerged pipeline east-southeastward of Porto Corsini.

Southbound.—The following courses from the positions indicated will lead to a position 4 miles eastward of the entrance to Porto Corsini:

From close off Pličina Albanež (Secca Pericolosa) Lighthouse (sec. 6B-7), 258° for 67 miles.

From a position 3 miles westward of Capo Salvore Lighthouse (sec. 6B-41), 216° for 76 miles.

From the entrance of Porto di Lido (Venice) (sec. 5B-26), 160° for 28 miles to a position 6 miles eastward of Punta della Maestra Lighthouse (eastern mouth of Fiume Po della Pila, sec. 5A-5), whence 203° for 31 1/2 miles.

4B-24 Current.—The coastal current at the entrance is generally southeasterly, increasing in velocity with northeasterly wind, and diminishing, often reversing direction, with southeasterly wind. The channel current is not wholly dependent on the stage of the tide but is influenced by bad weather, rains, and thaws.

Current signals are displayed from a signal mast situated at the root of the southern mole and consist of the following: Two green lights disposed vertically indicate current is running in, and disposed horizontally that current is running out. By day, the lights are replaced by black balls.

Tide.—The high-water interval is 10 h. 24 m. The mean range is 1.7 feet, but an extreme range of 5.4 feet has been experienced.

Wind.—During winter, winds from the eastern semicircle prevail, causing seas to break over the moles. Generally in fair weather seasons, northwesterly breezes are experienced in the morning and southeasterly in the afternoon. Persistent and thick fog with calms are frequent in winter.

4B-25 Depths.—The depth in the entrance channel, which is about 1,500 yards long, is 6.2m (21 1/4 ft.). The controlling depth of Canale Corsini, which has a total length of 6.37 miles from the sea, including Darsena di Ravenna is 5.5m (18 ft.).

4B-26 Landmarks.—Anywhere on this part of the coast, which is flat and visible only from a short distance, the double hill of Bertinoro and Cappuccini (sec. 4B-21), about 16 miles southward of Ravenna, is first sighted, followed by the pine forest on coast. The domes and towers of the churches of Ravenna can be seen amidst the surrounding trees from a distance of about 8 miles, and lastly are seen the houses of Porto Corsini and the lighthouse, which stands isolated. Southward of the port entrance is a large white building of a beach resort; the

building is surmounted by a tower and is often visible even in hazy weather.

4B-27 Porto Corsini and Canale Corsini (Candiano).—Porto Corsini is entered between two moles about 44 yards apart, which project about 625 yards east-northeastward from the coast. Two rubble breakwaters, one close northward and the other close southward of the entrance moles, were nearing completion of their extension in 1968. A fog signal is sounded from the eastern end of the northern breakwater. The sides of the entrance channel are quayed from the roots of the moles to the confluence of Canale Baiona and Canale Corsini, about 775 yards west-southwestward. A small basin for fishing craft indents the quay at Porto Corsini on the southern side, close westward of the lighthouse. Canale Baiona, which is navigable for only a short distance, leads westward as a continuation of the entrance channel. A quay, 360 feet long 5.8m (19 ft.) alongside, is located on the northern side of Canale Baiona and just westward of the confluent canals. Canale Corsini leads generally southwestward for about 5 miles to Porto di Ravenna.

Canale Corsini, whose banks are quayed in places, has a surface width of about 164 feet and a bottom width of 82 feet. There are special regulations for vessels navigating this channel and control signals are displayed from the signal station situated at the root of the southern mole. At night, two red lights disposed horizontally, with a white light beneath them, indicates that entrance to Porto Corsini is prohibited.

A red conical buoy, moored about 200 yards eastward of the head and on the axis of the southern mole, marks the sunken mole obstruction. Vessels are to pass northward of the buoy when entering or leaving the harbor.

4B-28 Lights.—Porto Corsini Light is situated near the root of the southern mole; a radiobeacon transmits from the lighthouse. A light is shown from the head of each mole. A fog signal is sounded from the head of each mole.

A light buoy is moored about 2 1/2 miles east-northeastward of Porto Corsini Light.

A light is shown from the head and the root of each of the rubble breakwaters being extended (sec. 4B-27).

A light is shown about 3 1/2 miles east-southeastward of Porto Corsini Light. A fog signal is sounded at the light structure.

A lighted drilling platform is situated about 10 miles eastward of Porto Corsini Light.

Porto Corsini Light. A fog signal is sounded at the light structure.

Pipeline—Light Buoy.—An oil pipeline terminal is marked by a light buoy with nautophone moored about 5 1/4 miles east-southeastward of Porto Corsini Light. The buoy is positioned at the outer limit of a prohibited area which extends about 2 1/4 miles seaward from the light 3 1/2 miles east-southeastward of Porto Corsini; a charted danger area lies between the latter light structure and the shore.

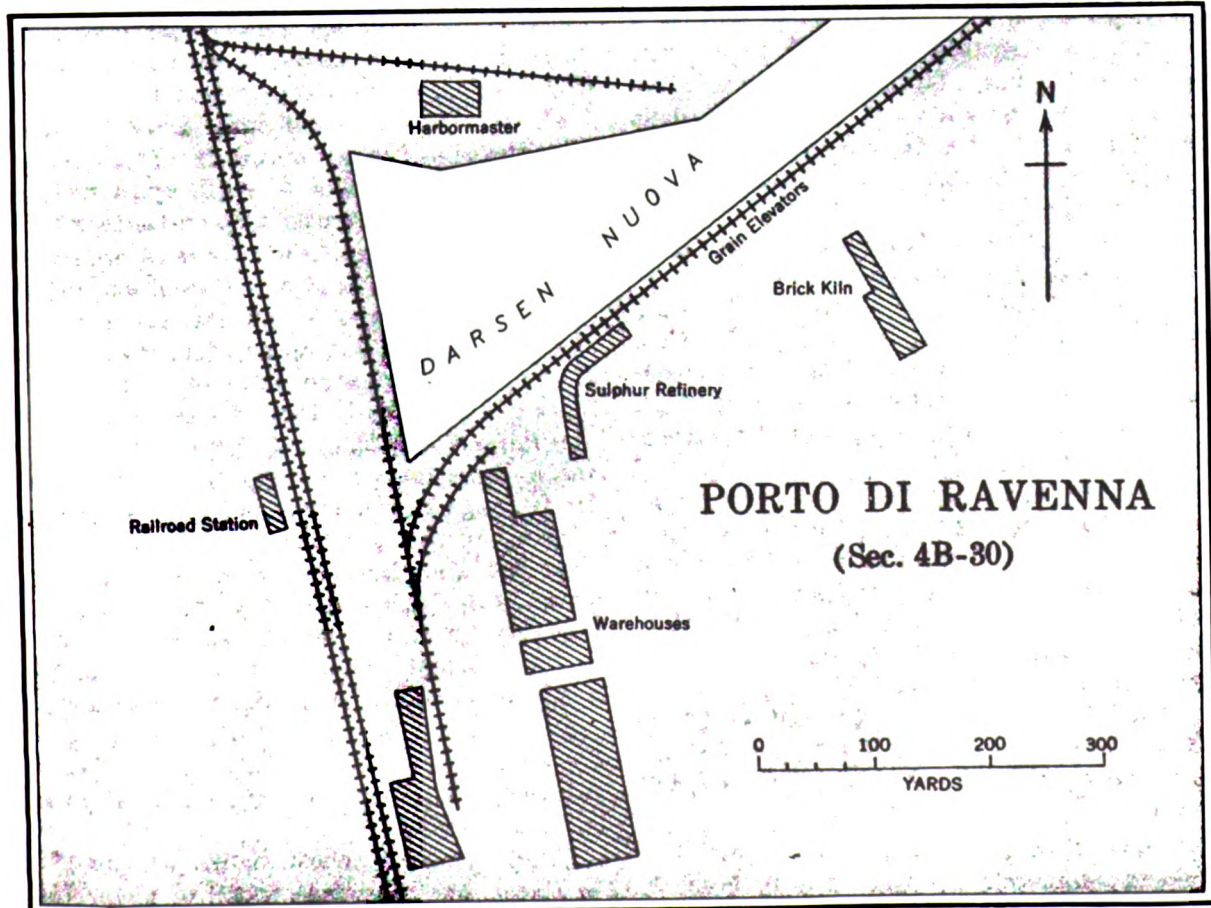
A prohibited anchorage area 1 1/4 miles wide and 6 1/2 miles long, has its northwest-

ern corner in a position about 3 miles southward of Porto Corsini Light. Fishing is prohibited within the area.

4B-29 Porto di Ravenna.—Canale Corsini terminates southwestward in Darsena Nuova, a triangular quayed basin about 1,800 feet long and 656 feet wide, situated on the eastern side of Ravenna. About 275 yards from the entrance of Darsena di Ravenna, an overhead cable, with a vertical clearance of 147 feet at maximum high water, crosses the canal.

Pilotage is compulsory for vessels of more than 350 gross tons and/or vessels with greater drafts than 13 feet 10 inches. Draft limits in the canal are 17 1/2 feet for large vessels and 18 feet for small vessels. Pilots will board vessels about 1/2 mile off the entrance to Porto Corsini; they will not take vessels in, or transit the canal, at night.

Directions for entering.—Vessels must keep as much as possible on the axis of the canal and proceed with caution, following



the pilot's advice for the possible presence of sandbanks. The external limits of the danger zone on the extension of the southern mole is marked by a can buoy, which must be kept to port when entering.

Entrance to the canal, which is normally difficult, is dangerous and not adviseable in bad weather. The sea, especially with an ebb current, becomes rough and makes steering of the vessel very difficult. Moreover, the rate and direction of the current is difficult to judge by those who are not familiar with the area.

Sometimes with a rough sea from the northeast and southeast quadrants and heavy rains, the level of the water rises; when the sea becomes calm again the gathered mass of water flows violently and creates whirlpools.

Entrance signals are shown from the signal station at the root of the southern mole. Entrance is permitted if no signals to the contrary are shown. Entrance is not permitted if the following signals are shown: by day a black ball, and by night two fixed red lights shown horizontally, with a fixed white light shown between and below the red lights so as to form an inverted triangle with the lights at the corners. In case of poor visibility, the signal is shown from the head of the south mole.

4B-30 FACILITIES.—Ravenna, population about 100,000, originally stood on the coast but is now approximately 4 miles inland. It is built on low flat ground on the border of the pine forest previously mentioned. The industries are agriculture, sulphur, and sugar refining, the manufacture of bricks, cement, and chemical fertilizers. A moderate import and export trade is conducted at Porto di Ravenna, whereas fishing is the principal activity operating from Porto Corsini.

On the northern side of Darsena di Ravenna is 1,890 feet of berthing space; on the southeastern side, 1,650 feet; and on the western side, 660 feet. The depth alongside at all berths is 5.5m (18 ft.) except for some sections where, owing to an underwater escarpment breasting off a few feet is necessary. All quays are served by double railroad tracks.

Cranes available are as follows: two electric cranes on tracks of 2½ and 3 tons capacity, two automotive cranes of 1 and 2 tons capacity, and two floating sheerlegs on barges of 30 and 40 tons capacity. A new (1969) heavy lift floating crane (800 ton capacity) is intended for use in and near the port of Ravenna.

Three tugs are available for assisting in berthing.

Some minor repairs can be effected. There is a marine railway with a 300-ton capacity.

Some provisions are procurable. Water is laid on the quays, but the supply is limited during summer. Fuel and diesel oil is supplied by barge at any wharf. There is a civil hospital.

The city is connected to the general railway system. Radio, telephone, and telegraph services are available.

Deratting can be carried out and Deratting Certificates and Deratting Exemption Certificates issued.

LANDMARKS—COASTAL FEATURES (Continued)

4B-31 About 3¾ miles northward of Porto Corsini, a drainage canal opens to the sea between two short moles, and about 4½ miles farther northward, Fiume Po di Primaro, of shallow depth, enters the sea. Shifting shoals front the river mouth.

Between the mouth of Fiume Po di Primaro and Canale del Bianco, 8½ miles northward, there is a bight, the shore being a strip of low land with occasional groups of conspicuous tall slender trees terminating in a series of small sand dunes which separate Laguna di Comacchio from the sea. This lagoon, fed with sea water entering Canale Pallotta and Canale del Bianco, embraces an area of 150 square miles.

Porto Garibaldi ($44^{\circ}41' N.$, $12^{\circ}15' E.$) lies at the mouth of **Canale Pallotta**, 3 miles north-northwestward of the mouth of **Fiume Po di Primaro**, and is entered between two moles extending 415 yards east-northeastward from the shore. Three groins parallel the beach northward of the moles. The shores of the channel are irregularly quayed but can be used only by craft of shallow draft. The village of **Comacchio** is situated on **Canale Pallotta** amidst salt marshes, 3 miles west-northwestward of **Porto Garibaldi**.

The mouth of **Canale Pallotta** may be identified by a ridge of pine trees and a unique grouping of houses. Conspicuous are: the lighthouse; two pointed campaniles in **Comacchio**; two prominent towers, that to northward rising near a massive black building. Dense fog is frequent.

Lights.—A light is shown from a white cylindrical tower, 41 feet high, attached to a two-story brick-colored building situated near the root of the northern mole. Each mole is marked near its head by a light shown from a post. A fog signal is sounded at the light structure near the head of the northern mole.

Canale del Bianco, another outlet of **Laguna di Comacchio** about $5\frac{1}{2}$ miles northward of **Porto Garibaldi**, is completely obstructed during some months but is

opened by dredging for the requirement of fishery. A conspicuous customhouse with a red roof stands on the southeastern bank of the channel, and the isolated campanile of **Pomposa**; on **Fiume Po di Volano** 5 miles northeastward, is a good mark.

ANCHORAGES

4B-32 Porto di Ancona.—See section 4B-11.

Senigallia.—See section 4B-17.

Fano.—See section 4B-18.

Pesaro.—In about 6 fathoms over poor holding mud about $1\frac{1}{2}$ miles off the town. (See sec. 4B-18.)

Cattolica.—In depth desired over good holding ground off the village. (See sec. 4B-19.)

Porto di Rimini.—See section 4B-20.

Bellaria.—In depth desired over good holding ground off the village. (See sec. 4B-20.)

Cresenatico.—Anywhere in depth desired over good holding mud and sand. (See sec. 4B-21.)

Cervia.—See section 4B-21.

Porto Garibaldi to Volano.—In fair weather in about 5 fathoms at a distance of about $2\frac{1}{2}$ miles offshore anywhere, but mariners are cautioned to take continuous soundings in the approach. (See sec. 4B-31.)

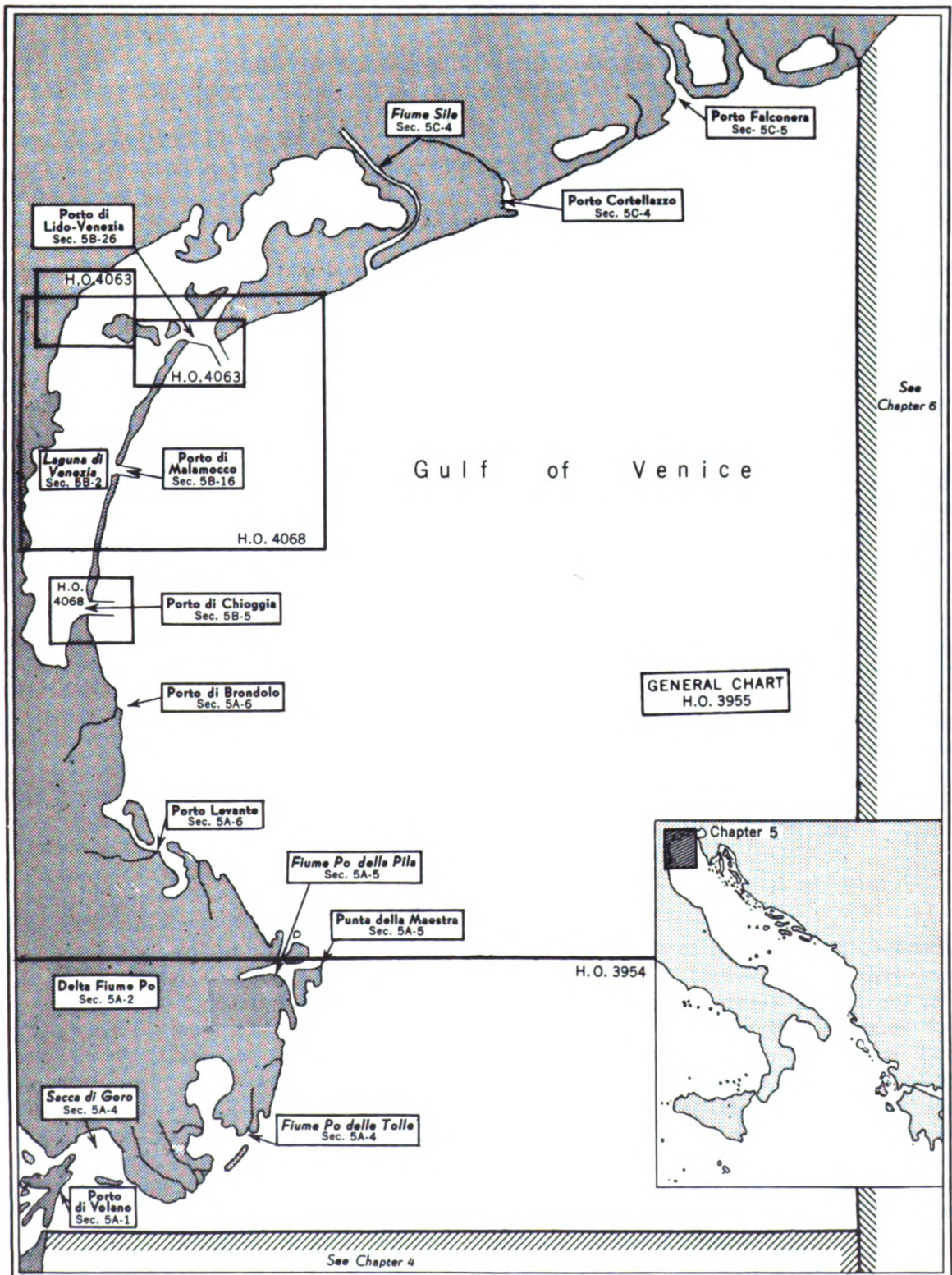


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.
 Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 5—GRAPHIC INDEX

CHAPTER 5

THE WESTERN AND NORTHERN COAST OF THE GULF OF VENICE FROM DELTA OF FIUME PO TO PUNTA DEL TAGLIAMENTO

Part A. Delta of Fiume Po.

Part B. Laguna di Venezia, including Porto di Chioggia, Porto di Malamocco, and Porto di Lido-Venezia.

Part C. Punta Sabbioni to Punta del Tagliamento.

Plan.—The coast in this chapter, comprising the Italian shore of the Gulf of Venice, is described northward and northeastward in sequence.

PART A. DELTA OF FIUME PO

5A-1 Porto di Volano ($44^{\circ}49' N.$, $12^{\circ}16' E.$) is situated at the mouth of Fiume Po di Volano, $2\frac{3}{4}$ miles north-northeastward of Canale del Bianco. (See sec. 4B-31.) The mouth of the river, which lies between two low sandy spits, is indistinguishable but is marked by a few houses and a tower, northward of which extends a large forest.

A light is shown on the low sandy spit southeastward of Volano. A fog signal is sounded at the light.

COAST—GENERAL

5A-2 Fiume Po rises in the Alps at Monviso and after flowing 280 miles, receiving in its course the water of numerous tributaries, discharges into the northwestern Adriatic through a vast delta. The delta may be considered to extend from Porto di Volano to Porto Caleri, 17 miles northward in a direct line, but about 29 miles following its periphery. The soil brought down by the river and deposited in the sea has extended the delta 10 miles eastward of the natural coastline and is steadily advancing eastward at an estimated rate of 45 yards a year. This condition produces rapid and uncertain alterations in offshore depth.

There are seven major branches from Fiume Po Grande with numerous mouths at all branches, and, since all the intervening land is low, flat, and marshy, identification of any part of the delta is most difficult if not impossible even for those with local knowledge. The major branches in order

northward are; Po di Volano, Po della Pila, Po della Maestra, and Po di Levante, the northernmost.

The four practicable passages have sufficient depth only for small craft.

The yellow color of the river water discolors the sea for a considerable distance and indicates, in clear weather, proximity to the delta. Large masses of mist, however, spread over the delta area during a great part of the year which contributes additional hazard to close approach.

Currents.—The waters of the Fiume Po flow into the sea and are almost always influenced by the Adriatic circulation; however, they also tend to extend eastward a considerable distance. The currents at the mouth of the river are not considered dangerous because they tend to set the vessel away from the dangerous and low lands of the river delta.

NAVIGATION

5A-3 Because of the rapid and uncertain changes in depth between Po di Goro and Po della Maestra, vessels should not approach the delta closer than 5 miles nor within a depth of less than 15 fathoms. The light buoy off Punta della Maestra together with those marking the coastal route are described in Nemedri, and since they are of a temporary character, are omitted in this publication. However, as long as they are established they should be employed for navigational assistance.

LANDMARKS—COASTAL FEATURES

5A-4 *Sacca di Goro*, a semicircular bay 3 miles wide and obstructed by shoals, lies between *Porto di Volano* and the mouth of *Po di Goro*, $5\frac{1}{2}$ miles eastward. *Rada di Goro* lies southward of the bay and provides an anchorage in about $4\frac{1}{2}$ fathoms in a position about 4 miles southeastward of *Porto di Volano*.

Fiume Po di Goro and *Fiume Po della Gnocca* discharge through manifold mouths at a low peninsula, $2\frac{1}{2}$ miles wide, which separates *Sacca di Goro*, to westward, and *Sacca degli Scardovari*, a long shallow bay, to the northeastward. *Po di Goro Light* is shown on the southern point of *Po di Goro*. The campaniles of *Goro* and of *Gorino* rising $5\frac{1}{4}$ and $8\frac{1}{4}$ miles northwestward, respectively, of the light are fairly prominent.

Fiume Po delle Tolle empties into the sea through two mouths; one facing southward and situated eastward of *Sacca degli Scardovari*, and the other, called *Busa del Bastimento*, discharging 4 miles north-northeastward. A light marks the mouth of *Busa del Bastimento*. The white structure of *Casa Bonelli* with a turret atop is visible in a position $\frac{3}{4}$ mile south-southwestward of the junction of *Busa del Bastimento* and the southern branch of *Po delle Tolle*, as is a tall chimney northeastward.

5A-5 *Punta della Maestra* ($44^{\circ}58'$ N., $12^{\circ}32'$ E.), the easternmost portion of the delta of *Fiume Po*, is an ill-defined low, marshy point comprised of many islands, situated about 4 miles north-northeastward of the entrance to *Busa del Bastimento*. Trees near the point are visible at a distance of 5 miles. As previously mentioned, shoals are constantly developing eastward of the point and mariners are cautioned to keep not less than 5 miles offshore.

Fiume Po della Pila.—About $4\frac{1}{2}$ miles west-

ward of *Punta della Maestra*, *Fiume Po Grande* divides into *Po delle Tolle* which flows southeastward, and *Po della Pila* which continues eastward, and, about 2 miles westward of the point, divides into three major streams or mouths entering the sea. These are *Busa Tramontana*, running to northward, *Busa di Levante* to eastward at the point, and *Busa di Scirocco* to southward. A light is shown from the northern point of *Busa di Levante*. A red light buoy is moored $2\frac{1}{2}$ miles eastward of the river entrance.

Fiume Po della Maestra enters the sea on the northeastern side of the delta, 7 miles northwestward of *Punta della Maestra*.

Fiume Po di Levante, navigable only by small craft, discharges through a narrow constricted mouth, $2\frac{1}{2}$ miles northwestward of the mouth of *Po della Maestra*. The low weathered houses and the companile of *Porto Levante* are visible near a marsh 1 mile southward of the river entrance. Two range lights are shown on the western side of the entrance. The front range is moved to conform to channel changes at the entrance. A buoy is moored nearly $1\frac{1}{5}$ miles east-northeastward of the rear range light. The entrance channel lies southwestward of the above buoy and is marked by 8 black and white buoys.

Porto Caleri, 8 miles north-northwestward of *Porto Levante*, is reached through a small lagoon opening in the coast and can be identified by a conspicuous grove of trees northwestward. A conspicuous tank stands about $2\frac{1}{2}$ miles northward of *Porto Caleri*.

5A-6 The coast from *Punta della Maestra* to *Porto Caleri* has scanty landmarks, but those offering some identification are the campaniles in the villages of *Tolle*, $5\frac{1}{2}$ miles westward of *Punta della Maestra*; *Maestra*, $5\frac{1}{2}$ miles northwestward of the point; *Contarina*, $1\frac{1}{2}$ miles farther northwestward; and *Rosolina*, 7 miles farther northwestward.

Porto Fossone at the mouth of Fiume Adige, and **Porto di Brondolo** at the mouth of Fiume Brenta are situated $4\frac{1}{2}$ and $5\frac{3}{4}$ miles northward, respectively, of Porto Caleri. Obstructing shoals at their mouths prohibit entrance by any craft except those of extremely shallow draft, although both rivers communicate with numerous inland navigable canals.

From Porto Brondolo the coast, which is composed of dunes of fine sand, extends 3 miles northwestward to Porto di Chioggia.

ANCHORAGE

5A-7 Rada di Gora.—See section 5A-4.

PART B. LAGUNA DI VENEZIA

5B-1 Fiume Brenta ($45^{\circ}11' N.$, $12^{\circ}19' E.$), situated $5\frac{3}{4}$ miles northward of Porto Caleri (see sec. 5A-6), is the southern boundary of Laguna di Venezia.

COAST—GENERAL

5B-2 Between Punta della Maestra (see sec. 5A-5) and Punta del Tagliamento, about 46 miles northeastward, the coast forms a large bight to northwestward and consists of a low sandy shore intersected by marshes. The largest of these marshes, lying between Fiume Brenta to southward and Fiume Sile to northward, a littoral distance of about 28 miles, forms Laguna di Venezia. In the lagoon are hundreds of islands and the city of Venezia is built upon a small archipelago of 122 islets. The lagoon forms a basin which is separated from the sea by a long strip of land forming a natural sea wall consolidated by artificial walls called *murazzi*, which still further preserve the lagoon against the action of seas. In the vicinity of Venezia this strip of land is named *Il Lido*.

There are three principal channels leading to Venezia, that at Porto di Chioggia which is accessible for vessels of light draft, and

those at Porto di Malamocco and Porto di Lido, both of which may be used by vessels of deep draft; the last is used more frequently.

NAVIGATION

5B-3 The coast of Laguna di Venezia may be approached safely with usual caution, the depths shoaling gradually and uniformly shoreward. The 6-fathom curve lies about $1\frac{3}{4}$ miles offshore. This stretch of coast is almost destitute of landmarks except for the campaniles of the larger villages.

PILOTAGE

5B-4 Pilotage in the Laguna di Venezia area is divided into two sections, namely, sea pilotage and that of the inner channels. The first section comprises the area lying westward of a line drawn from Fiume Piave Vecchia Lighthouse (see sec. 5C-4) to Punta della Maestra Lighthouse (see sec. 5A-5) and includes Porto di Chioggia, Porto di Malamocco, and Porto di Lido. The second section consists of the channels which, from the interior of Porto di Malamocco and Porto di Lido, lead to the various anchorages and berths at and near Venezia.

The first section is subdivided into two sectors, outer and inner. The outer sector lies between the line joining Fiume Piave Vecchia Lighthouse and Punta della Maestra Lighthouse, and the line joining Fiume Vecchia Lighthouse and the campanile at Chioggia (see sec. 5B-9); the inner sector embraces the remainder.

In the first section pilotage is optional. In the second section it is compulsory for all ocean-going vessels.

The pilot station for Laguna di Venezia is situated at San Nicolo di Lido, on the southern side of the entrance to Porto di Lido, and will respond day and night to advance notice or the usual signals.

PORTO DI CHIOGGIA**Position:** 45°14' N., 12°17' E.**Depths:**

Entrance, 15 feet.

Avamporto, 10 to 45 feet.

Porto Interno, 10 to 15 feet.

Tide: Average range, 1.3 feet.

5B-5 Porto di Chioggia, which consists of the Avamporto and the Porto Interno, is situated at the southern end of Laguna di Venezia, 19 miles northwestward of Punta della Maestra and westward of Lido di Sottomarina, on which is constructed the murazzi which protects the town of Chioggia and the inland lagoon. The port is entered between two breakwaters extending eastward from an opening in the coastal strip of sand.

5B-6 Navigation.—The following courses from the positions indicated will lead to a position 2 miles eastward of the breakwater entrance to Porto di Chioggia:

From close off Pličina Albanež (Secca Pericolosa) Lighthouse (sec. 6B-7), 294° for 72 miles.

From a position 1 mile westward of the center breakwater of Porto Franco Nuovo in Porto di Trieste, 247° for 62 miles.

From a position 6 miles eastward of Punta della Maestra Lighthouse (sec. 5A-5), 319° for 20 miles.

5B-7 Current, wind, and tide.—Strong currents are produced by heavy rains, the height of the rivers, and by gales rather than by the stage of the tide. Strong easterly winds cause a strong current between the breakwaters.

Wind from the eastern semicircle is most common, often blowing strong and raising a considerable sea in the Avamporto.

The high-water interval is 10 h. 19 m. The average range is about 1.3 feet, the greater range occurring usually in October, November, and December, and the lesser in January and February. During strong southeasterly wind a range of 3.9 feet has been experienced.

5B-8 Depths.—The controlling depth in the entrance channel is 15 feet. Though a large area of the Avamporto has a depth of only 10 feet and less, there are depths in the small frequented anchorage of 16 to 45

feet. The controlling depth in the entrance to Porto Interno and along the northern side of Bacino di Vigo is 14 feet, while the remainder of the port has depths of 10 to 15 feet. A 13-foot patch lies on the northern side of the entrance channel about 700 yards northeastward of Forte San Felice Light. Submerged rocks extend over 200 yards beyond the ends of the breakwater.

5B-9 Landmarks.—The two objects usually sighted first are the campanile at Pellestrina, 2 miles northward of the entrance, and the tall reddish brick campanile of the Duomo, located at the southern extremity of Chioggia. On nearer approach, vessels will sight next the two forts near the inner end of the breakwaters, the buildings of Sottomarina and Chioggia, and the campaniles of the villages southward, previously described. Sometimes in clear weather the distant Colli Euganei near Padua can be seen.

5B-10 Anchorage can be taken in 9 fathoms over mud and sand with the campanile of the Duomo bearing about 260°, distant 2 miles. This anchorage is suitable only in fine weather and during offshore winds. In Avamporto there are about three anchorage berths southwestward of Forte San Felice for vessels not exceeding 300 feet in length and with a draft not over 16 feet. Mooring buoys are found westward and southwestward of Forte San Felice.

Submarine cables are found on the northern side of Bacino di Vigo, northwestward of Forte San Felice, and near the captain of the port's office; anchorage is prohibited in these areas which are marked by notice boards.

5B-11 The Avamporto is located at the southern end of Laguna di Venezia at the intersection of Canale di Caroman and Canale Perognola, both of which are marked by pile beacons or buoys and lead northward to Porto di Malamocco and Porto di Lido. The port is entered between two breakwaters extending eastward about 1,650 yards, the southern one from Murazzi di Sottomarina, and the northern one from the southern extremity of Isola di Pellestrina. The distance between the breakwaters is about 590 yards. Forte San Felice stands on the inner end of the southern breakwater, and Forte Coroman near the inner end of the northern.

5B-12 Navigational Aids.—A light is shown from Forte San Felice. A signal station is located at the fort.

The head of each breakwater is marked by a light. A fog signal is sounded on a nautophone from the light structure on the southern breakwater.

A range leads through the center of the entrance between the breakwater. A light is shown from the front structure; the towers are in range $275\ 1/2^\circ$.

A light is located northward of Forte San Felice, near the root of the northern breakwater.

A radio direction-finder station is located in a position about 500 yards southeastward of Forte San Felice.

5B-13 Porto Interno consists of Bacino di Vigo which lies northward of the town of Chioggia and is protected northward by Diga delle Saline. The basin is 1,148 feet long and 410 feet wide. A channel, marked by piles and a buoy, leads from the Avamporto into the eastern side of the basin. Four canals of shallow depth lead southward through the town from the basin.

A light is shown at the eastern entrance point of Canale San Domenico, the easternmost canal of the basin.

Stazione Marittima, a rectangular quayed basin, 820 feet long and 394 feet wide, lies northwestward of the town. Alongside this basin's eastern quay, which is about 616 feet long, is a depth of about 4.5m (15 ft.); a quay 197 feet long, with 4.5m (15 ft.) alongside, extends along the southern side. A 4.5m (15 ft.) channel leads westward along the edge of the flat extending northward from Diga della Saline to the entrance of the basin; Dolphins mark the edge of the flat.

5B-14 Directions for entering.—A shoal spot with a depth of about 4.5m (15 ft.) is located about 400 yards southward of the head of the northern breakwater, and the southern side of the channel between the breakwaters is reported to be shoaling. In order to obtain the greatest depth, a vessel should enter between the heads of the breakwaters about midway between the range, bearing about

$275\frac{1}{2}^\circ$, and the head of the southern breakwater, whence immediately close and favor the northern side of the channel. When the western corner of Forte San Felice bears about southwest, alter course to pass about 70 yards westward of the fort and to eastward of the buoy moored about 150 yards westward of the fort, whence course may be shaped for the desired anchorage. Careful regard must be given to the current.

Pilotage.—It was reported (1962) that there was only one pilot, and advance notice should be given through the Captain of the port for his services.

5B-15 FACILITIES.—Chioggia, population about 47,151, is built on an island in the southern part of of Laguna di Venezia and is connected southward by a bridge to Lido di Brondolo, and eastward to Sottomarina. Though the town is principally a maritime one engaged in fishing, there are also industries of cement and brick making and wooden boat building. There is a small import and export trade.

There is a berthing space, about 755 feet long, for vessels not exceeding 262 feet in length and a draft of 15 feet alongside the dolphins in Bacino di Vigo at Diga delle Saline.

There is a marine railway with a capacity of 200 tons. Divers are available.

Fish and vegetables are abundant, but other provisions are limited in amount. Though water is piped to the quays its supply for vessels is scarce. Small amounts of fuel oil and diesel oil are available.

Chioggia is connected to the railway system and there is regular steamer connection with Venezia and other ports in the vicinity. The intricate inland canal system connects Chioggia with Venezia and with many other communities.

There is a small hospital.

PORTO DI MALAMOCCHO

Position: $45^\circ 20' N., 12^\circ 19' E.$

Depths:

Entrance channel, 5.8m (19 ft.) to 14m (46 ft.).

Anchorage, 7m (23 ft.) to 9.7m (32 ft.).

Channels to Venezia, 6.4m (21 ft.).

Tide: Spring range, 2.5 feet; mean range, 1.5 feet.

5B-16 Porto di Malamocco.—Isola di Pellestrina, a low sandy natural dyke amplified by a higher murazzi, extends 6 miles northward from the entrance of Porto di Chioggia

to the entrance of Porto di Malamocco. The port is entered between Isola di Pellestrina to southward, and Isola di Malamocco to northward, and between two breakwaters. It consists essentially of an anchorage at the junction of four channels in Laguna di Venezia: Canale Spignon and Canale di San Pietro, leading southward to Chioggia; Canale Fisoletto, leading westward to secondary inland ports; and Canale Rocchetta, leading northward to Venezia and facilities in that vicinity.

A naval exercise area extends about 23 miles eastward from the coast between the campanile at Pellestrina (sec. 5B-20) and a position close southward of the southern entrance of Porto di Malamocco.

5B-17 Navigation.—The following courses from the positions indicated will lead to a position 2 miles eastward of the head of the northern breakwater at Porto di Malamocco:

From close off Pličina Albanež (Secca Pericolosa) Lighthouse (sec. 6B-7), 299° for 73 miles.

From a position 1 mile westward of the center breakwater of Porto Franco Nuovo in Porto di Trieste (sec. 6B-47), 252° for 58.5 miles.

From a position 6 miles eastward of Punta della Maestra Lighthouse (sec. 5A-5), 331° for 24 miles.

5B-18 Current and tide.—The tidal current enters the lagoon through both Porto di Malamocco and Porto di Lido, the strength varying. In Porto di Malamocco the current between the breakwaters sometimes attains a velocity of 4 knots and tends to scour the channel. The ebb currents from the various channels meet off Forte San Pietro forming strong eddies and have a strong set towards the northern side of the entrance channel.

The high-water interval is 10 h. 30 m. The spring range is 2.5 feet, the mean is 1.5 feet.

5B-19 Depths.—The entrance channel had depths of 5.8m (19 ft.) to 14m (46 ft.) in 1958. A detached shoal; with a depth of 4.5m (15 ft.), lies about 280 yards northwestward of the head of the southern breakwater. A vessel of deep draft is cautioned not to enter without local knowledge. Only small vessels now

use the route through Canali Rocchetta, Malamocca, San Spirito and Orfano, which was reported, in 1959, to have depths of only 4.1m (13 3/4 ft.) in places.

5B-20 Landmarks.—To southward of the entrance the most prominent landmarks are: the quadrangular reddish-roofed campanile of Pellestrina located about 2 miles northward of the southern extremity of the island of the same name; the slender pointed campanile of San Antonio, 1 mile farther northward; and about 1 mile southward of the entrance to Porto di Malamocco there is the conspicuous church of San Pietro in Volta. The campanile of Malamocco rises about 2 miles north-northeastward of the entrance and in clear weather the campanile of San Marco in Venezia can be seen to rise above the city and all others in the lagoon. From closer inshore a vessel will sight the light structures and forts at the entrance, and the prominent Torre Piloti, painted in white and black horizontal stripes, situated about 3/4 mile northward of the entrance.

Port Marghera refinery flare is conspicuous.

5B-21 Anchorages.—Vessels waiting to enter the port will find a convenient berth in a depth of 13m (7 fm) with the head of the northern breakwater bearing 295°, distant 1 mile. An anchorage in 9.7m (32 ft.) of water for a vessel up to 350 feet in length is located with Rocchetta Lighthouse bearing 034°, distant 365 yards. Smaller vessels may anchor off the village of Alberoni.

Prohibited anchorage areas exist near the roots of the northern and southern breakwaters, where submarine cables are laid and are marked by notice boards.

There are several mooring buoys westward of Diga Palata delle Ceppe.

5B-22 The harbor is entered between two breakwaters about 490 yards apart, the northern extending approximately 1,450 yards east-southeastward from the shore at the southern extremity of Isola di Malamocco, and the southern extending about 1,070 yards in the same direction from the shore at the northern extremity of Isola di Pellestrina. The southern breakwater has a

knuckle extending northward near its mid-length. Forte San Pietro stands at the southern entrance point, and Forte Rocchetta at the northern with Forte Alberoni a short distance northeastward.

A dangerous wreck lies sunk about $4\frac{2}{3}$ miles east-northeastward of the northern breakwater heads. The mast is only $4\frac{1}{2}$ feet below the surface. The area within a radius of 1 mile of the wreck is dangerous to navigation.

A semicircular bay, about $\frac{1}{2}$ mile wide and into which flow the four channels previously mentioned, is formed between the southwestern extremity of Isola di Malamocco and the low lying land of the lagoon westward. Several short piers and a quay with shallow depth alongside are located at the village of Alberoni, westward and northwestward of Forte Rocchetta. Diga Palata delle Ceppe is a stone groin extending about 300 yards northward from the western corner of Forte San Pietro. There is a narrow opening near its shoreward end.

5B-23 Navigational aids.—Rocchetta Light is shown on the western part of the northern entrance point. This light in range $287\frac{1}{3}^\circ$ with a tower about $\frac{2}{3}$ mile farther west-northwestward leads in between the breakwaters. Three lighted buoys mark the range.

The head of each breakwater is marked by a light. A fog signal is sounded on a nautophone from the head of the northern breakwater.

A light is shown on the head of Diga Palata delle Ceppe.

The southwestern extremity of a shoal with depths of less than 5.5m (3fm) that extends 340 yards westward from Rocchetta Lighthouse is marked by a buoy.

A disused signal station is located at Torre Piloti, nearly 1 mile northeastward of Rocchetta Light.

Pilotage.—Vessels requiring a pilot must request one from the pilot station at San Nicolo di Lido. See section 5B-4.

5B-24 Directions for entering.—A vessel should enter between the breakwaters with Rocchetta Light, and the tower, about $2/3$ mile west-northwestward in range $287\frac{1}{3}^\circ$, keeping to the northern side of the channel to obtain the deepest water. When the head of Diga Palata delle Ceppe bears about 250° a mid-channel course should be pursued to the anchorage, remembering that deeper water exists off the head of the groin than off the northern shore.

When strong northeasterly winds have been blowing, mariners are cautioned that there will be a strong southwesterly set, and under such circumstances it is advisable that a vessel approach the entrance with the head of the southern breakwater bearing about 250° , and when the head of the northern breakwater is abeam to northwestward, head into the channel with increased speed until the stern is under the lee of the breakwater. It is dangerous to stop the engines and even worse to reverse them before the vessel is under the protection of the breakwater, even if the bow is swung so as to be facing the rocks.

5B-25 FACILITIES.—There are none at Porto di Malamocco. At Alberoni (sec. 5B-22), where steamers plying between Venezia and Chioggia stop, there is telegraph and telephone service, and motor connection to Il Lido.

PORTO DI LIDO-VENEZIA

Position: Entrance, $45^\circ 25' N.$, $12^\circ 26' E.$

Depths:

Entrance channel, 10m (33 ft.).

Channel to Porto di Venezia, 10.3m (34 ft.).

Quays at Porto di Venezia, 6.1m (20 ft.) to 8.8m (29 ft.).

Stazione Marittima, 1m ($3\frac{1}{4}$ ft.) to 9.7m (32 ft.).

Channel to Porto Marghera, 10.9m (36 ft.).

Porto Marghers, 5.5m (18 ft.) to 8.8m (29 ft.).

Tide: Springs rise 2.3 feet; neaps, 1 foot.

Port plans:

Stazione Marittima, Plan A, section 5B-51.

Porto Marghera, Plan B, section 5B-51.

5B-26 Porto di Lido is formed between the northeastern end of Isola di Malamocco,

6½ miles north-northeastward of the entrance to Porto di Malamocco, and Punta Sabbioni, 1¼ miles eastward, and is entered between two breakwaters. It consists of Canale di San Nicolo, from which Canale di San Marco leads northwestward towards Porto di Venezia, Stazione Marittima, and Porto Marghera. The lesser Canali di Treporti, di San Erasmo, and delle Navi lead from the northeastern, northern, and northwestern sides, respectively, of Porto di Lido.

Measured distance.—A measured distance of 22,245 feet lies off the coast between Porto di Lido and Porto di Malamocco on a 229° - 049° course. One end of the course is determined by the Hotel Excelsior front, which lies on the coast about 1 1/3 miles southward of the entrance to Porto di Lido, and San Marco Campanile in range about 310°. The other end is determined by the alinement of the steeple at Malamocco and Poveglia Campanile on a bearing of about 333°. See section 5B-30.

All the shipping facilities of the Estuario Veneto will be described in the following sections under the major heading of Porto di Lido-Venezia.

NAVIGATION

5B-27 The following courses from the positions indicated will lead to the approach light buoy off Porto di Lido, situated 2.35 miles 132° from the head of the northeastern breakwater:

From close off Pličina Albanež (Secca Pericolosa) Lighthouse (sec. 6B-7), 303° for 72 miles.

From a position 1 mile westward of the center breakwater of Porto Franco Nuovo in Porto di Trieste (sec. 6B-47), 254° for 53 miles.

From a position 6 miles eastward of Punta della Maestra Lighthouse (sec. 5A-5), 342° for 26.5 miles.

CURRENT, TIDE, AND WIND

5B-28 The maximum velocity of the tidal current is about 3 knots, diminishing toward the interior of the lagoon.

The high-water interval is 10 h. 19 m. substantially the same as at the other ports of the lagoon. Springs rise 2.3 feet, neaps 1 foot. The flood and ebb current at Porto di Lido reach their maximum velocity near the time of low and high water, respectively, at Gibraltar. Wide variability of this relationship has been reported. Local tide predictions should be obtained when accurate data are required. At times an unrelated phenomenal rise of 3.9 feet has occurred which induces, consequently, a greater current. Strong southeasterly winds occasionally cause water to overflow the quays.

During the three summer months the breeze alternates regularly between a land breeze in the morning from the northeastern quadrant, and in the afternoon a sea breeze from the southeastern quadrant. In the other months the northerly component predominates. During the 3 months of regularity, the breeze shifts from the land to the sea at 10 or 11 a. m., continuing until about 8 p. m., when the breeze springs from the southwestern quadrant. From September through February the wind, on the average, diminishes toward sunset. In the remaining months the winds are lightest in the night and strongest in the early afternoon.

Fog is most frequent during the months of December, January, and February, averaging 8 to 9 days of fog a month.

DEPTHS

5B-29 The controlling depth in the entrance channel between the breakwaters, in 1952, was 10m (33 ft.). In Canali di San Nicolo, di San Marco, and della Guidecca, the channels leading to Porto di Venezia and to Stazione Marittima, the controlling depths in the fairways is about 10.3m (34 ft.). Canale Vittorio Emanuele III (Canale di Marghera), the entrance channel to Porto Marghera, had a controlling depth of 10.9m (36 ft.) in 1952. The turning basin off Stazione Marittima was dredged to 10.9m (36 ft.) in 1951, and the turning basin in Porto Marghera has a depth of 8.8m (29 ft.). The controlling depth in Canale delle Navi is 9.7m (32 ft.) and that in Canale dei Marani as far as Murano is 6.1m (20 ft.).

LANDMARKS

5B-30 The buildings of the city of Venezia are mostly obscured by Isola di Malamocco but the campanile of San Marco rises above all else and is identified easily from sea. The steeple is massive, terminating in a greenish quadrangular pyramid with white corners and surmounted by a golden angel. Also conspicuous are the large Hotel Excelsior surmounted by two cupolas standing on the beach at Il Lido, 2 miles southwestward of the entrance, and the white framework light structure at Fiume Piave Vecchia (sec. 5C-4), about $7\frac{1}{2}$ miles east-northeastward of Punta Sabbioni. The campaniles of Malamocco, Pellestrina, and Chioggia are visible usually to southward.

ANCHORAGE

5B-31 Vessels may anchor in a depth of 13m (7 fm) to 16.5m (9 fm) at a distance of 2 miles offshore anywhere between the entrance and Fiume Piave Vecchia (sec. 5C-4). Vessels waiting to enter will find a good anchorage in 12m (6 $\frac{1}{2}$ fm) with the campanile of Burano in line with Forte Treporti bearing about 335° , and San Marco campanile in line with the light structure on the head of the southwestern breakwater bearing about 285° . Forte Treporti is situated about 2 miles northward of the head of the northeastern breakwater, and Burano campanile about 2 miles farther north-northwestward.

There is insufficient swinging room for ocean-going vessels to anchor in the port.

The above anchorages are not considered safe anchorages, especially with a scirocco. Vessels should leave the anchorage when a scirocco threatens and possibly seek shelter under the Istrian coast.

A number of mooring buoys are anchored off the northern side of Canale di San Marco between the public gardens and Punta della Salute. These buoys are for the use of naval vessels only. A group of four mooring buoys are anchored westward of the signal station and close offshore.

Anchoring is prohibited in an area reserved for sea planes bounded roughly by a line drawn through the front range structure, the signal station, the light buoy eastward of Santa Elena, the southeastern corner of La Certosa, thence to position of origin.

HARBOR—PORTO DI LIDO

5B-32 Breakwaters.—The northeastern breakwater extends 1,000 yards southeastward from Punta Sabbioni, and the southwestern breakwater extends 3,270 yards in the same direction from the eastern corner of the airport at San Nicolo di Lido, the northern extremity of Isola di Malamocco. The outer portion of the two breakwaters are parallel at a distance of 980 yards.

5B-33 The entrance channel leads from sea between the two breakwaters and joins Canale di San Nicolo at the latter's northeastern end.

When dredges are working they will indicate, by two balls disposed vertically or two white lights similarly arranged, the side on which they may be passed at moderate speed.

Canale di Treporti, which also serves as a port of the same name and which will accommodate vessels not exceeding 10 feet of draft, leads from the entrance channel at a position eastward of Punta Sabbioni, whence it pursues a north-northeasterly direction for $2\frac{1}{2}$ miles where it is joined to Canale di Burano, which, in turn, leads to the town of Burano, $1\frac{1}{2}$ miles northwestward.

A torpedo launching zone is located in Canale di Treporti. Red flags are shown from the launching site $\frac{1}{2}$ hour before and during exercises. When the signal is flying, entrance to the canal is forbidden, and vessels in the area must leave immediately.

Canale di San Erasmo is a narrow channel with a depth of about 1.5m (5 ft.) which leads from the entrance channel over a shoal at a position about 440 yards eastward of the front range structure. This channel leads into Canale Carbonera, about 1 mile north-northwestward.

5B-34 Navigational aids of the entrance channel.—An approach light buoy is moored about 2 1/3 miles southeastward of the northeastern breakwater head.

Two lights in range 301° lead in the fairway between the breakwaters and thence northwestward. An auxiliary light is shown from the front structure; a directional light shows an intensified beam along the range line.

A lighted bell buoy, is moored about 1 mile southeastward of the southwestern breakwater head.

The head of the northeastern breakwater is marked by two lights shown from a framework structure. A fog signal is sounded at this structure.

The head of the southwestern breakwater is marked by a light.

A light beacon is located about midway along the southwestern breakwater. A fog signal is sounded at the beacon.

A buoy about 3/4 mile northwestward of the southwestern breakwater head marks sunken wrecks.

A buoy marked with the letter "E", is moored near the edge of the bank at the mouth of Canale Treporti about 1 mile northwestward of the southwestern breakwater head.

The entrance channel is marked additionally by a number of light buoys.

5B-35 Canale di San Nicolo begins at the northwestern terminal of the entrance channel, northward of San Nicolo di Lido, and extends southwestward for 1 1/2 miles to Santa Elena, the easternmost suburb of Venezia. Its southeastern side is formed by San Nicolo di Lido, and its northwestern by Le Vignole, a group of three islands; Forte San Andrea, on the southeastern extremity of them, commands the channel. The least navigable width of this channel is 185 yards.

A signal station is situated at the northern extremity of San Nicolo di Lido. Two ob-

struction lights, horizontally disposed, are shown on the semaphore station.

5B-36 Navigational aids of Canale di San Nicolo.—Three lighted beacons mark the approximately 120° turn from the entrance channel into Canale di San Nicolo. Two beacons are located on the southern side of the turn, northwestward and east-northeastward, respectively, of the signal station, and the other beacon is located on the northern side, west-southwestward of the front range structure.

A light is shown from Forte San Andrea.

Two light buoys mark the eastern and southern extremity, respectively, of the shoal extending from Santa Elena.

5B-37 Canale delle Navi is entered from Canale di San Nicolo between the flats off Santa Elena, on its southwestern side, and those off La Certossa of Le Vignole, on its northeastern side, and leads northwestward for 3/4 mile to the Arsenale. From the latter place this channel becomes Canale dei Marani and leads northward in an easterly arc to Murano, a small glass-making town with alongside depths sufficient only for small craft.

Two buoys, one lighted, mark the northern entrance point, and one buoy marks the southern entrance point of Canale delle Navi.

Two mooring buoys are found on the eastern side of the entrance to this channel.

5B-38 Arsenale.—This naval installation is situated at the eastern end of the city on Canale delle Navi, about 3/4 mile northwestward of its junction with Canale di San Nicolo. There is a quadrangular quayed basin with depths of about 6.1m (20 ft.) which is entered through a channel 82 feet wide. Some dry docks are situated on the western side of Canale delle Navi close northeastward of the Arsenale.

HARBOR—PORTO DI VENEZIA

5B-39 Canale di San Marco is entered from the western end of Canale di San Nicolo, southward of Santa Elena, whence it sweeps westward in a northerly arc for nearly $1\frac{1}{2}$ miles to Punta della Salute, the southern entrance point of Canale Grande. The public gardens, immediately westward of Santa Elena, and the eastern part of Venezia form its northern boundary. This shore is quayed as far westward as the famous Piazza San Marco at the northern entrance point of Canale Grande. Flats and Isola San Giorgio form the southern side of this channel.

Several lights are shown from the southern side of the channel marking the entrances to secondary channels.

Canale Orfano is entered from Canale di San Marco, southwestward of Santa Elena, and leads to Porto di Malamocco via Canali di Santo Spirito, di Malamocco, and Rocchetta.

5B-40 Canale della Giudecca is a continuation westward of Canale di San Marco and leads for $1\frac{1}{4}$ miles to Stazione Marittima. The quayed southern shore of the city forms its northern side, and the partially quayed shore of the suburb of La Giudecca constitutes its southern.

5B-41 Bacino di Marittima (Stazione Marittima.) —This commercial cargo facility is located at the western side of the city and entered from the western end of Canale della Giudecca. It consists of two piers, each about 2,400 feet long; Molo di Levante, about 315 feet wide, to eastward; and Molo di Ponente, about 722 feet wide, to westward. The two piers are separated by Bacino di Marittima. Canale Scomenzera is a narrow basin lying eastward of Molo di Levante. The quayed southern part of the city for a distance of about 2,725 feet eastward of Canale Scomenzera is included in this facility.

A 200 yard turning basin lies just southwestward of Bacino di Marittima.

A fog signal is sounded close southeastward of the head of Molo di Levante.

HARBOR—PORTO MARGHERA

5B-42 Porto Marghera, an industrial and commercial port, is situated between 2 and $3\frac{1}{2}$ miles northwestward of Bacino di Marittima, to which it is connected by Canale di Marghera (Vittorio Emanuele III) (Canale di Marghera), which is 262 feet wide at the bottom; it is 4,370 yards long. The channel is marked by two pairs of lights, and by another pair where the channel enters the port between two short breakwaters. A 6.4m (21 ft.) patch is about $\frac{1}{2}$ mile northwestward of the northern breakwater.

5B-43 Porticchio dei Petroli and Darsena Raffineria are petroleum facilities located at the southeastern part of the port.

5B-44 Turning basin. — The entrance channel extends northwestward past the petroleum facilities and leads to a turning basin about 355 yards in diameter. A light marks each entrance point into the basin.

5B-45 Bacino Commerciale No. 1, which is quayed, leads west-northwestward from the turning basin. It is about 1,110 yards long and 87 yards wide.

5B-46 Canale Brentella extends northward from the turning basin and terminates in a smaller basin. Berths are provided along the side of this channel.

5B-47 Canale Industriale Nord, a little over 1 mile long, extends northwestward from the turning basin and is provided with berths similarly as is Canale Brentella. A ship construction and repair yard is situated at the head of the channel. Each side of the entrance is marked by two lights, displayed vertically.

5B-48 Canale Industriale Ovest extends $\frac{1}{2}$ mile west-northwestward from the head of the proposed Bacino No. 3 to a smaller basin, whence it continues about 1 mile northward. It has an average width of 80 yards. The northern arm of this channel has berths alongside dolphins and T-piers.

PILOTAGE

5B-49 Pilots meet incoming vessels about 2 miles southeastward of the entrance

to Porto di Lido. In heavy weather they may venture out only as far as the heads of the heads of the breakwaters, or just inside them.

During fog, pilots searching for vessels scheduled to enter the harbor, sound two long blasts and two short blasts. Vessels should answer with two long blasts and one short blast to assist pilots in locating the vessel.

Vessels wishing to enter Porto di Lido at night should give advance notice so that berthing arrangements can be made.

For pilotage regulations for the Laguna di Venezia area, see section 5B-4.

DIRECTIONS FOR ENTERING

5B-50 A vessel should line up on the range, bearing 301°, before passing westward of the lighted bell buoy. A channel 100 yards on each side of the range and for a distance of 1.2 miles southeastward from the heads of the breakwaters has been dredged to a depth of 10.9m (36 ft.), and a vessel of deep draft should be in position on the range before arriving at the buoy.

When the lighted beacon, situated 400 yards east-northeastward of the signal station, draws abeam, bearing about 211°, the course should be altered southwestward, conforming to the channel and pass midway between the mooring buoys off San Nicolo di Lido and the pier extending from Forte San Andrea. If any current is running it will be found to be strongest at this position, and the larger ships are assisted by tugs in making the turn.

The larger vessels which expect to berth alongside Riva dei Sette Martiri (Riva dell'Impero) or secure bow and stern to buoys off the public gardens should enter the breakwater between one and one and one-half hours before slack high water. This precaution will insure slack water at the customary turning position, between Punta della Salute and San Giorgio, where the channel has a navigable width of about 800 feet. This maneuver permits vessels to be heading seaward when berthed.

Some mariners prefer to execute this maneuver during the last of the flood current so as to be stemming the current when securing the bow.

FACILITIES

5B-51 The city of Venezia is situated about 2 miles from the shore near the center of Laguna di Venezia and stands on an archipelago of 122 islets, connected by 400 bridges and intersected by 176 canals. The city is bisected by the famous Grande Canale which, in the form of the letter S, connects Canale della Guidecca near Piazza San Marco with Canale di Santa Chiara at the railway station. The city is connected to the mainland at Mestre, north-westward, by Ponte della Libertà, a bridge 2 miles long which carries the railway. The population is about 322,000.

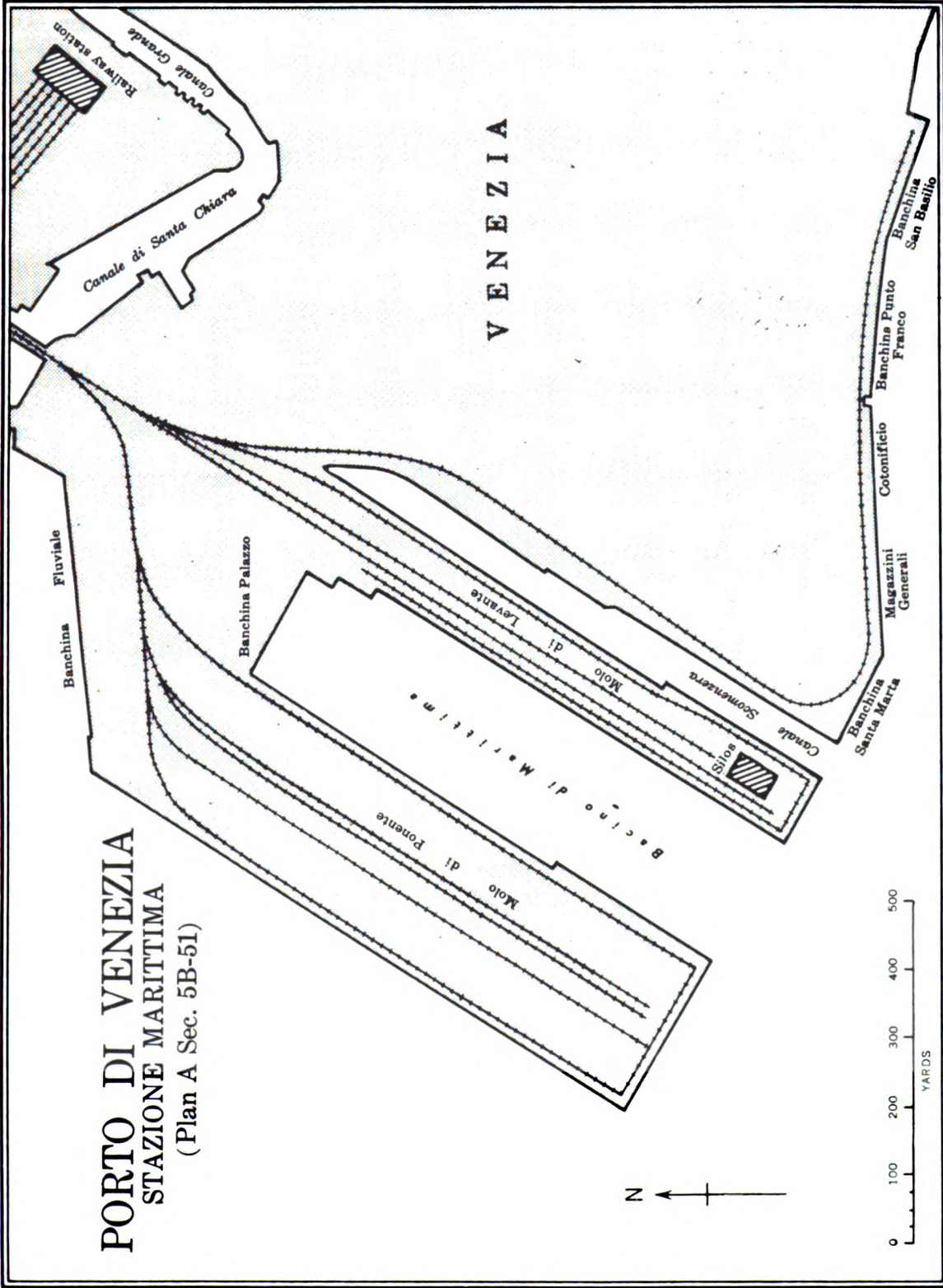
The principal industries are the manufacture of its famous glassware, carved furniture, lace, mosaics, porcelain, goldsmiths' work, and articles of wrought iron, the material for all of which is imported. The chief imports are coal, grain, petroleum products, phosphates, and lumber. Fishing is active in the lagoon.

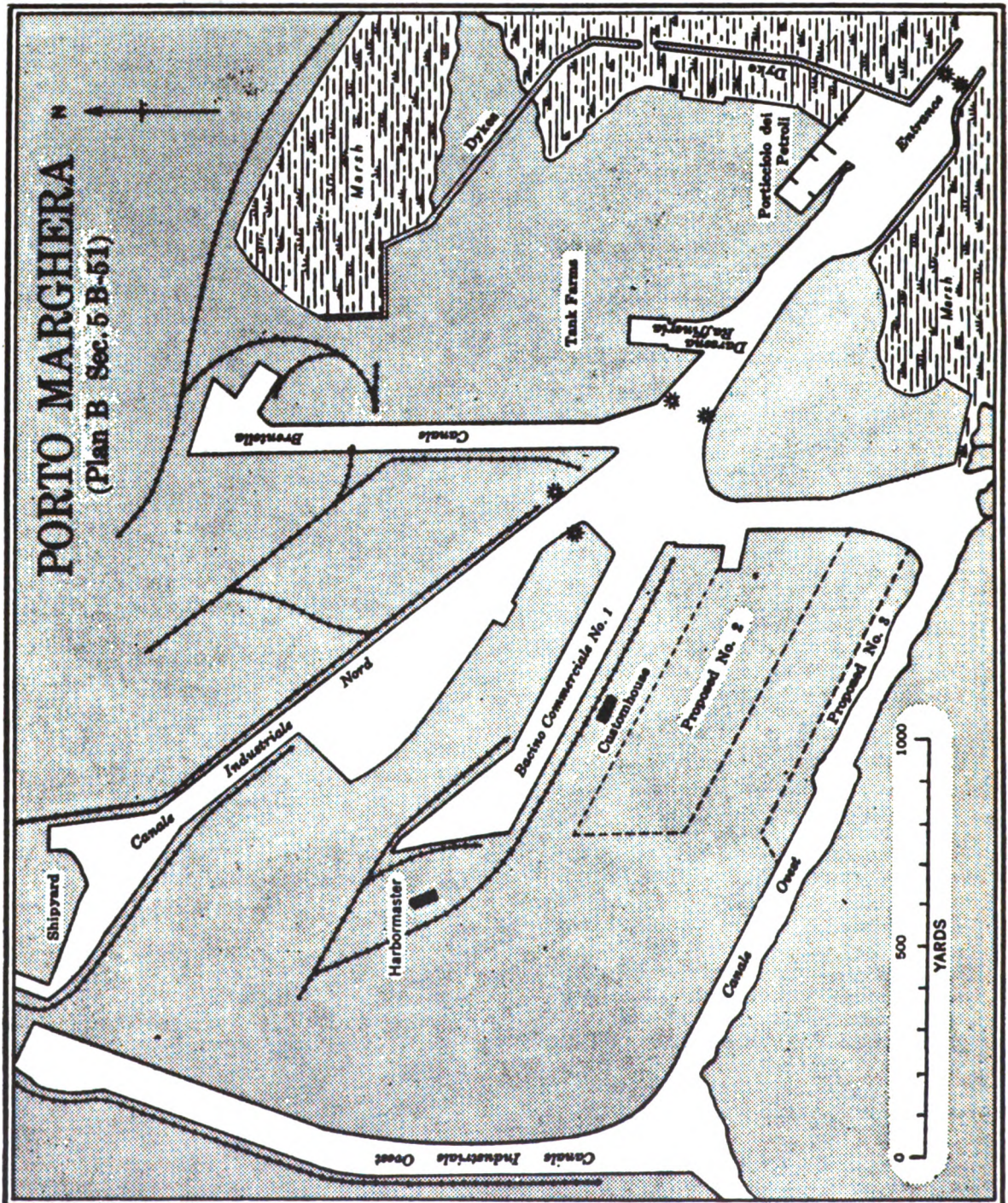
The United States is represented by a consul and a vice consul.

Berths—Canale di San Marco.—The berths used normally by large naval vessels, passenger and cruise vessels are on the northern side of Canal di San Marco and consist of mooring buoys off the public gardens and off Piazza San Marco and alongside Riva dei Sette Martiri (Riva dell'Impero) where, at the latter location there is a berthing length of 1,160 feet with 8.8m (29 ft.) alongside. Banchina San Biagio, adjacent northwestward of Riva dei Sette Martiri, has a length of 310 feet and a depth of 8.5m (28 ft.). About 260 feet of the southeastern end of Banchina Forni has an alongside depth of 8.5m (28 ft.). Water for vessels at these berths is supplied by barge.

Canale della Guidecca (See Port Plan A).—A T-headed wharf at Fondamenta della Zattere, on the northern side of the channel, 1,200 yards westward of Punta della Salute, is used by packet ships and has a length of 260 feet and an alongside depth of 8.5m (28 ft.). Between the latter wharf and Bacino di Marittima there are five berths which are considered a part of Bacino di Marittima. Beginning at Canale Scemenzera and extending eastward these berths are: Banchina Santa Marta, 430 feet long, depth 7.3m (24 ft.); Magazzini Generali and Contonificio, 1,090 feet long, depth 7.9m (26 ft.); Banchina Punto Franco, 620 feet long, depth 7.6m (25 ft.); and Banchina San Basilio, 580 feet long, depth 8.2m (27 ft.). These berths have fresh water, railroad and crane facilities. Vessels can lie a short distance off the quays on the southern side of the channel.

Bacino di Marittima (See port plan A).—The berths at Bacino di Marittima consist of the quayed sides of Molo di Levante, Molo di Ponente, Canale Scemenzera, Banchina Palazzo, and Banchina Fluviale. The approximate lengths and alongside depth of these berths are as follows:





Berth	Usable length (feet)	Depth (ft.)
Head of Molo di Levante	305	7m (23 ft.) to 9.7m (32 ft.)
Northwestern side of Molo di Le- vante	950	8.5m (28 ft.)
Banchina Palazzo	1,040	6.7m (22 ft.)
Southeastern side of Moli di Po- nente	490	8.8m (29 ft.)
	1,670	7.3m (24 ft.) to 8.2m (27 ft.)
Head of Molo di Ponente	735	9.7m (32 ft.)
Northwestern side of Molo di Po- nente	2,780	8.5m (28 ft.) to 9.1m (30 ft.)
Banchina Fluviale	1,250	4.9m (16 ft.) to 5.5m (18 ft.)

The berths in Canale Scomenzera are used by small craft. Shallow water fronts the northern part of the southeastern side of Molo di Ponente.

All berths have fresh water, railroad and crane facilities. Grain cargoes are discharged near the head of Molo di Levante where the grain silos are situated.

Porto Marghera (See port plan B).—Two medium size tankers with a draft of about 8.5m (28 ft.) can be accommodated in both Porticciolo dei Petroli and in Darsena Raffineria.

The commercial port consists principally of Bacini Commerciale No. 1 where there are about 6,000 feet of berthing space with a depth of 8.5m (28 ft.)—9.4m (31 ft.). There are several mobile cranes of 1 1/2 to 4 1/2 tons capacity and bridge-transporter cranes for coal handling.

The industrial port occupies the remainder of Porto Marghera and the industrial establishments bordering the channels are equipped for discharging their own cargoes. The available berthing space is as follows: Canale Brentella, 1,400 feet with depths up to 8.8m (29 ft.); Canale Industriale Nord, 5,800 feet with depths to 8.8m (29 ft.); and Canale Industriale Ovest, 5,400 feet with depths of 2.4m (8 ft.) to 8.8m (29 ft.). Fresh water at Porto Marghera is delivered by barge.

The combined ports of the area are equipped with tugs, water and fuel barges, and considerable light-erage. Cranes of 3 to 30 tons are available. It is

estimated that the commercial working capacity of of the port is approximately as follows: Stazione Marittima, 31 vessels; Bacino Commerciale No. 1, 13 vessels; the remainder of Porto Marghera, 20 vessels; and mooring buoys and other berths, 36 vessels.

Supplies.—Fresh fruit and vegetables are available in season in unlimited quantities, but stocks of dry provisions are limited. Fresh water and fuel oil can be supplied by barges.

Repairs.—There are four ship repair yards that can undertake any reasonable repairs. At the Arsenale, which is operated by the government, there are three dry docks, the largest having the following dimensions: length on bottom, 803 feet; width at entrance, 115 feet; depth on sill H.W.O.S., 11.9m (39 ft.). There is a 170-ton crane at the Arsenale. Divers are available.

Communication.—Regular steamer service plys between Venezia and the ports of the world. The city is served by the railway and a motor road through Mestre. There is an airport at San Nicolo di Lido.

Deratting.—Deratting can be carried out and Deratting Certificates and Deratting Exemption Certificates issued.

Hospital.—There is a civil hospital to which seamen can be admitted by consular request.

PART C. PUNTA SABBIONI TO PUNTA DEL TAGLIAMENTO

5C-1 Punta Sabbioni (45°26' N., 12°26' E.), the northeastern entrance point of Porto di Lido, is the western extremity of a stretch of low, sandy, and bare beach.

COAST—GENERAL

5C-2 From Punta Sabbioni, the coast, which is low, sandy and bare trends 31 miles east-northeastward to Punta Del Tagliamento. It is backed by two lagoons, the principal one of which contains Venezia, and the other is Laguna di Caorle which is entered at Porto Falconera, about 23 miles east-northeastward of Punta Sabbioni. The network of inland waterways in and between these lagoons connects Venezia with the principal rivers and with the sea by various parts.

NAVIGATION

5C-3 This stretch of coast may be approached safely with usual caution, the depths shoaling gradually and uniformly shoreward. The 6-fathom curve lies about 1 3/4 miles offshore.

LANDMARKS—COASTAL FEATURES

5C-4 Porto di Piave Vecchia, situated at the mouth of Fiume Sile 7 miles east-north-

eastward of Punta Sabbioni, is obstructed at its entrance by a shoal over which there is a depth of about 1.8m (6ft.). A light is shown on the western entrance point. A tank stands about $2\frac{1}{2}$ miles west-southwestward of the light.

A wreck lies about 4 miles southeastward of the light at Porto di Piava Vecchia.

A naval exercise area fronts the coast and extends up to 6 miles offshore from between a position about 1 mile east-northeastward of Porto di Piave Vecchia and a position about $2\frac{1}{2}$ miles east-northeastward of the northern entrance point of Porto Cortellazzo.

Porto Cortellazzo, situated at the mouth of Fiume Piave, 7 miles east-northeastward of Porto di Piave Vecchia, is navigable for small craft only. The entrance is obstructed by shoals having a depth of 0.3m (1 ft.) to 0.9m (3 ft.). The houses of the village of Cortellazzo are visible between tall trees near the river mouth. A wreck lies close southward and several wrecks lie about $1\frac{1}{4}$

miles east-northeastward, respectively, of the northern entrance point. Three submerged concrete columns, about 55 yards apart, lie about $\frac{1}{3}$ mile southward of the mouth of the river.

Caution.—The coast between Porto Cortellazzo and Caorle should be approached on soundings and only in favorable weather. The Fiume Piave deposits a very white and milky substance into the sea which, when seen from a distance, appears as a white sandy stretch of beach.

Porto Santa Margherita lies at the mouth of Fiume Livenza, $6\frac{1}{2}$ miles northeastward of Porto Cortellazzo. The river can be entered only by small boats. Two jetties form the entrance to the mouth of the river. The head of each jetty is marked by a light. A white truncated conical buoy is moored in the entrance, and should be left to port when entering.

Caorle is a village situated on the shore 1 mile northeastward of Porto Margherita near a point of land projecting slightly east-

ward. The village which is conspicuous is protected by a stone seawall. A prominent campanile rises from the village, and on the point of land east-northeastward another campanile rises from the church of Madonna degli Angeli. A light is shown from the extremity of the point of land eastward of the latter church. A 3-fathom bank is located about 1 mile southward of the light structure. A submerged mole extends about 550 yards southeastward from the coast about $\frac{1}{3}$ mile northward of Caorle Light. Its outer end is indicated by a red barrel-shaped marker.

5C-5 Porto Falconera, $11\frac{1}{2}$ miles north-eastward of Caorle, consists of the lower reach of Fiume Lemene and provides access to Laguna di Caorle. The entrance channel leads over a shoal having depth of about 0.9m (3 ft.), whence the channel deepens to as much as 6.1m (20 ft.) between a point of land to westward and a shoal to eastward. The port is much frequented by small craft for refuge and for working cargo.

Porto Baseleghe is situated $4\frac{1}{2}$ miles northeastward of Caorle in an inlet at the mouth of Canale dei Lovi. The inlet is almost completely obstructed by shoals and is used only by small craft with local knowledge. A red frame house stands on the shore at the western side of the inlet. A light is shown at the inlet.

The coast from Porto Baseleghe trends $4\frac{1}{2}$ miles eastward to Punta del Tagliamento and consists of low wooded land known as Pineta di Revellino.

Anchoring and fishing are prohibited within $1\frac{1}{2}$ miles of the coast between Porto Baseleghe and Fiume Tagliamento (sec. 6A-6).

For dangers off Punta del Tagliamento, see section 6A-1.

ANCHORAGE

5C-6 Fiume Piave Vecchia to Caorle, section 5C-4.—In 12m (6 $\frac{1}{2}$ fm) over mud and sand anywhere 2 miles offshore.

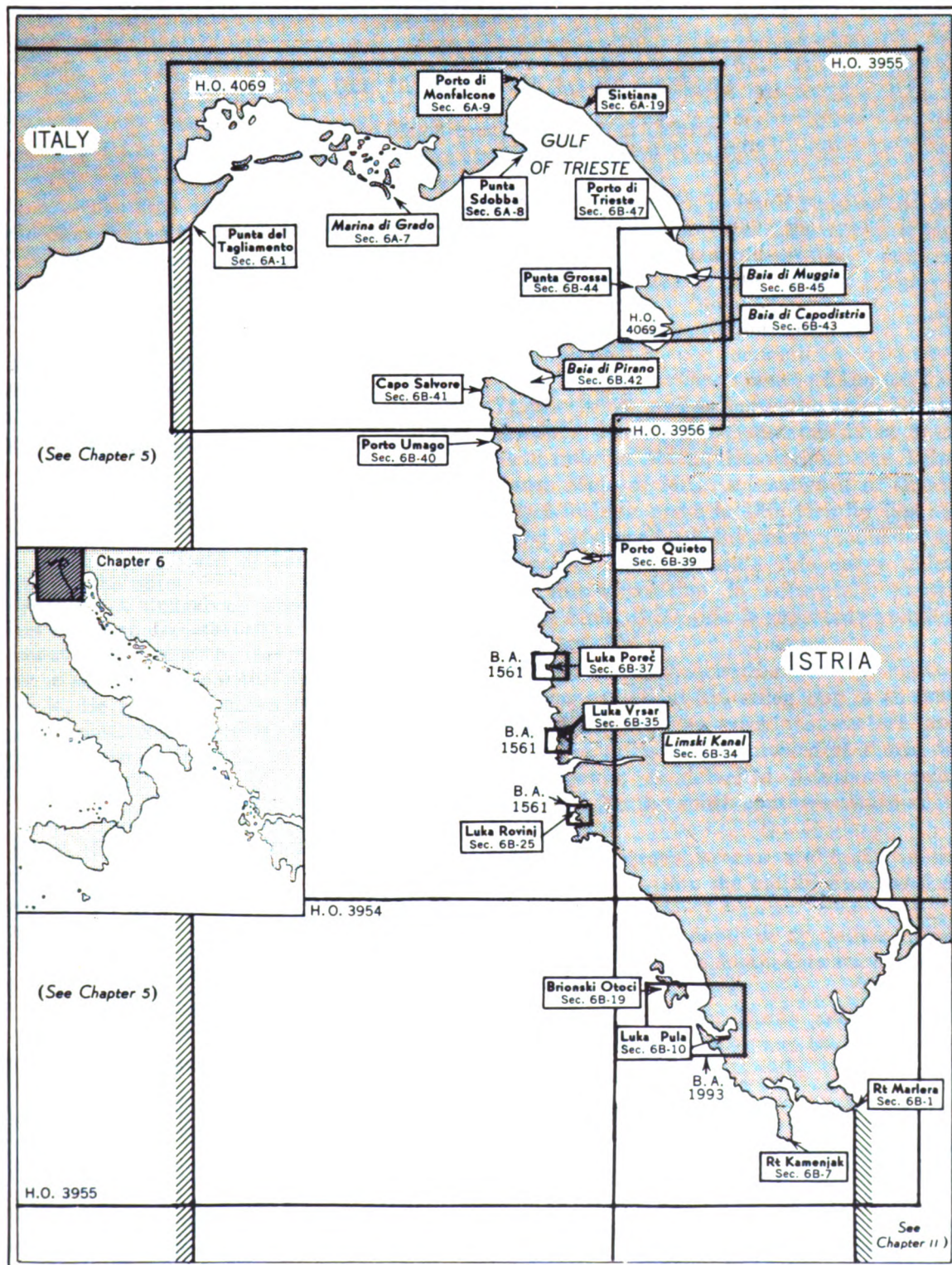


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office
 Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 6—GRAPHIC INDEX

CHAPTER 6

GULF OF TRIESTE AND WESTERN COAST OF ISTRIA FROM PUNTA DEL TAGLIAMENTO TO RT MARLERA

Part A. Punta del Tagliamento to Porto di Trieste.

Part B. Rt Marlera to and including Porto di Trieste.

Plan.—The area embraced by this chapter comprises the northern coast of Italy on the Adriatic Sea, including that bordering the Gulf of Trieste, and the coast of Yugoslavia formed by the western side of Istria. This coast is described in sequence eastward from Punta del Tagliamento to Porto di Trieste, and from Rt Marlera northward to and including Porto di Trieste.

PART A. PUNTA DEL TAGLIAMENTO TO PORTO DI TRIESTE

6A-1 Punta del Tagliamento ($45^{\circ}38' N.$, $13^{\circ}06' E.$) is a low point of land situated $4\frac{1}{2}$ miles eastward of Porto Baseleghe (sec. 5C-5) and 31 miles east-northeastward of the entrance of Porto di Lido. A light is shown on the point.

Wrecks.—A dangerous wreck lies about 6 miles south-southeastward of Punta del Tagliamento. Two wrecks, one with 9½ fathoms over it and the other with 7 fathoms of water over it, lie about $6\frac{1}{2}$ miles southward of the same point. See section 6B-41 for other wrecks in the vicinity.

COAST—GENERAL

6A-2 From Punta del Tagliamento to Grado, 12 miles north-northeastward, the coast forms a bight to northward, whence it trends irregularly 8 miles east-northeastward to Punta Sdobba, and consists essentially of a number of low islands, separated by channels and backed by mud flats which dry. These islands form the seaward boundary of a large lagoon which, though actually a single one, is known as Laguna di Murano to westward, and Laguna di Grado to eastward. The lagoon is entered through three principal mouths; Porto Lignano, Porto Buso, Marina di Grado. Between Punta Sdobba and the village of Duino, $3\frac{1}{2}$ miles northeastward, the shores continue low and form a bay to northwestward. From Duino the coast, which is no longer low and sandy but rocky and often steep, trends 10 miles southeastward to Porto di Trieste.

DANGERS

6A-3 The northern coast of the Gulf of Trieste is low and is bordered by extensive shoals which dry for a distance of as much as 1 mile in places, the largest one being Banco Mula di Muggia, eastward of Grado. The 6-fathom curve in this vicinity lies $3\frac{1}{2}$ miles offshore, and the coast should be approached nowhere inside this curve unless the ship's position is accurately known. Banco Mula di Muggia is reported extending eastward.

A detached shoal, with a depth of about 5 fathoms and about $3\frac{1}{2}$ miles long in an east-west direction, lies with its western end about $3\frac{3}{4}$ miles southeastward of Punta del Tagliamento. A detached 5-fathom rocky patch lies 2 miles south-southwestward of its eastern end.

Many dangerous wrecks are found in the approach and within the entrance to the Gulf of Trieste.

A shoal, with a depth of 5½ fathoms, lies about $2\frac{3}{4}$ miles east-southeastward of Punta Sdobba Light.

The coast between Duino and Porto di Trieste is steep-to and may be approached safely to a distance of $\frac{1}{2}$ mile.

NAVIGATION

6A-4 Except for the courses hereinafter described with ports, vessels should keep an offing of about $3\frac{1}{2}$ miles between Punta del Tagliamento and Baia di Panzano, section 6A-8. Between Duino and Porto di Trieste, a course 1 mile offshore charts all dangers.

CURRENT AND WEATHER

6A-5 The current in the center of the gulf is negligible but is influenced for the most part by the height of water in the northern part of the Adriatic and to a lesser degree by the prevailing wind. Under ordinary conditions the current along the northern coast attains a velocity of about 1 knot influenced locally by the discharge of water from river mouths.

Northeasterly wind, the bora, is exceptionally strong during the late autumn and winter and usually lasts 2 or 3 days. When it lasts longer, sometimes blowing for 9 days and longer, a growing strength is noted on the second day. In summer it blows generally during a change in weather, as during and after heavy rain, but in this season it is always of short duration. The bora is presaged by masses of whitish clouds rising behind the northeastern coast accompanied by a drop in temperature and a rise in the barometer.

The scirocco, southeasterly wind, which next to the bora is the most frequent wind in winter, seldom attains great force in the gulf, but may cause, if prolonged, a rise of water in the entire gulf which overflows the low coast of the lagoons.

During the fair season, southwest winds begin in the forenoon, veering through west to northwest in the afternoon, and in the course of the night the wind quite regularly becomes easterly.

During hot weather rainstorms at times come from the southwest accompanied by winds which attain the strength of a gale, suddenly raising high seas.

Fog is more frequent in the Gulf of Trieste than anywhere on the eastern shore of the Adriatic. The annual average is 20 days. Fog occurs more frequently during the winter, but is present often at other times in limited areas, especially in the morning, dispersing towards noon.

LANDMARKS—COASTAL FEATURES

6A-6 Fiume Tagliamento discharges through an entirely obstructed mouth, $\frac{1}{2}$ mile northward of Punta del Tagliamento. There is access to the river from Porto Base-

leghe (sec. 5C-5), and Porto Lignano, see below, above the entrance shoal, whence the river is navigable for 8 miles inland for craft with a draft of less than 11 feet. A pier extends 250 yards seaward from a position about $1 \frac{1}{5}$ miles northward of Punta del Taliamento.

A pier about 656 feet long with 8 feet off its head is about 2 miles north-northeastward of the light on Punta del Tagliamento. Two lights, displayed vertically, are shown from the pierhead.

Laguna di Marano and Laguna di Grado, similar in character to Laguna di Venezia, embraces a littoral distance of about 30 miles eastward from a position northward of Punta del Tagliamento. The greater number of the 25 islets lying in the lagoon, of which Grado is the most important, are sparsely inhabited.

Porto Lignano consists of a channel about 1 mile long extending northward into Laguna di Marano from an entrance located $4\frac{1}{2}$ miles northeastward of Punta del Tagliamento. The port is the best refuge for small vessels between Marino di Grado and Venezia. The controlling depth at the entrance is 8 feet. In 1954, it was reported that the channel is marked by buoys. The village of Lignano is situated on the western entrance point from which extends a short pier. A light is shown on the head of the pier. A lighted beacon is on the eastern side of the entrance channel about 400 yards east-southeastward of the head of the pier. Conspicuous in the vicinity of Lignano are: the tall chimney at Porto Mogaro, 8 miles north-northeastward; the campanile at Grado, 10 miles eastward; a conspicuous isolated group of trees at Porto Buso, 4 miles east-northeastward; and an obstruction light marking a tall building, about 197 feet high, about $1 \frac{1}{2}$ miles westward.

Porto Buso lies at the confluence of two rivers and two inland channels and is entered through a channel over a shoal with depths of about 9 feet, at a position 4 miles east-northeastward of Lignano. The narrow channel is marked by lighted beacons and buoys. A light is shown from a white framework and tank structure on a cement block situated 75 yards southeastward of the head of a pier extending westward from Isola

di Porto Buso, the eastern entrance point. A red customshouse is situated on each side of the entrance. A breakwater extends southward for about 1/3 mile from the southernmost tip of Isola di Porto Buso. A second breakwater, the extremity of which lies about 600 yards southwestward from the light shown from the white framework tower, extends in a north-northwestward direction to shore.

Porto Nogaro ($45^{\circ}49'$ N., $13^{\circ}13'$ E.), about 6 miles northward of Porto Buso, is a river port on the Fiume Corno. The river has a depth of about 16 feet in the channel with a 13 foot spot about half way up. On the east bank of the river is a wharf about 1,300 feet long with an alongside depth of about 9 feet. On the west bank of the river is a basin with a pier where tankers discharge at a draft of 13 feet. Near the end of the wharf on the east bank is a 5-ton diesel crane. There are several tugs; diesel oil is available.

6A-7 Marina di Grado ($45^{\circ}40'$ N., $13^{\circ}22'$ E.) consists of a breakwater-protected harbor lying northwestward and northward of the town of Grado, $6\frac{1}{2}$ miles east-southeastward of Porto Buso. An entrance channel, about 1 mile long and 185 yards wide with a depth of about 7 feet (1964), is marked by a lighted entrance buoy and other buoys and piles. The channel is subject to change. A nautophone is sounded from the head of the east breakwater.

Winds from the southerly quadrants, which are predominant in fall and spring, cause a very rough sea in the entrance. At such times, it is not advisable to land or seek shelter within the harbor.

The entrance is flanked by drying shoals, Banco d'Orio to westward, and Banco Mula di Muggia to eastward, which should not be approached closer than 2 miles and then only when the harbor entrance is identified.

See section 1-24 concerning danger areas.

About 450 yards north-northeastward of the heads of the breakwaters the entrance channel divides into two channels which in turn communicate with the inland canal system; Canale di San Pietro d'Orio which leads northwestward for 1 mile and has depths of 10 to 42 feet, and Canale di Grado which leads northeastward and eastward for $\frac{1}{2}$ mile to the northern side of the town and

has depths of 8 to 25 feet. A narrow quayed basin leads southward through the town from Canale di Grado. The town is connected to the mainland northward of the lagoon by a causeway which carries a roadway and forms the eastern side of Canale di Belvedere. A bridge with a movable span joins the town and the causeway.

Lights, in addition to the lighted entrance buoy, are shown from the following described positions: one, on the western side of the entrance southeastward of the western breakwater; southern end of the spit dividing the entrance channel into the two channels previously described; northern edge of the shoal on the southern side of the bend into Canale di Grado; eastern entrance point of Canale di Belvedere; western entrance point of Darsena di Grado; and head of the mole of the small boat basin.

Anchorage.—Large vessels can anchor offshore south-southeastward of Grado, sand and mud, good holding ground.

Anchoring is prohibited within 1 mile eastward and southward of the lighted entrance buoy.

Conspicuous off Grado are: a campanile in the center of the town; that of Aquileia, $5\frac{1}{2}$ miles northward; and a cupola rising above a prominent grove of trees eastward. There is a hospital at Grado.

6A-8 Banco Mula di Muggia. — Between Grado and Punta Sdobba, 8 miles east-northeastward, the coast consists of the low fringing islets of the eastern part of Laguna di Grado. Banco Mula di Muggia, whose western extremity lies about 2 miles east-southeastward of Grado, stretches about 3 miles northeastward and dries for a distance of as much as 1 mile in places. It is closely fronted by some rocky patches. A light is shown from a white framework structure on piles, the whole 28 feet high, situated in about $7\frac{1}{2}$ feet of water off the southern extremity of Banco Mula di Muggia, $11\frac{1}{2}$ miles southward of Isola la Rotta.

Punta Sdobba. — Fiume Sdobba, the last reach of Fiume Isonzo, discharges through a mouth that has formed Punta Sdobba, a low sandy point extending about $1\frac{1}{2}$ miles east-southeastward from the general coastline. The river has produced a drying flat extend-

ing $\frac{1}{2}$ mile eastward of the point and surrounded the mouth with extensive shoals. There is a small craft channel with a depth of less than 4 feet over the shoals to the river. The passage is marked by piles. A light is shown from a cylindrical cement tower, 25 feet high, situated in about 12 feet of water 1 mile east-southeastward of the mouth of Fiume Sdobba. The tower is not very conspicuous by day and then only in clear weather. A pyramidal beacon stands at the extremity of the eastern entrance point.

Baia di Panzano, about $2\frac{1}{2}$ miles in width and length, is a low-shored bay lying between Punta Sdobba and the small harbor of Duino, $3\frac{1}{2}$ miles northeastward. At the center of the entrance of the bay there is a depth of 5 fathoms which diminishes gradually westward and northwestward to a bordering shoal with depths of less than 3 fathoms which in places is as much as 1 mile wide. The marshy shores which prevail northeastward of Fiume Po end at Fiume Timavo, about 1 mile west-northwestward of Duino, whence the coast, known as Catena del Carso, rises in elevation southeastward. Porto di Monfalcone lies at the head of the bay.

Duino consists of a close grouping of yellowish houses and a castle on a coastal elevation overlooking a small mole-protected boat harbor. A light is shown from a black post, 16 feet high, located on the head of the eastern mole. A light is shown from a white tower with black bands about $\frac{1}{2}$ mile west-northwestward of the above light.

The description of the coast southeastward of Duino is continued in section 6A-19.

PORTO DI MONFALCONE

Position: $45^{\circ}47' N.$, $13^{\circ}23' E.$

Depths:

Entrance, 28 feet.

Porto Rosega, 16 to 32 feet.

Bacini di Panzani, 17 feet.

Quays, 10 to 38 feet.

Port plan: Section 6A-18.

6A-9 Porto di Monfalcone is situated at the head of Baia di Panzano and consists of three parts entered through a dredged channel; Porto Rosega, Bacini di Panzano, and Canale Valentinis. The town of Monfalcone is located at the head of Canale Valentinis about $1\frac{1}{2}$ miles inland.

NAVIGATION

6A-10 The following courses from the positions indicated will lead to the entrance buoy of the dredged channel at Porto di Monfalcone:

From a position 1 mile westward of the head of Molo Fratelli Bandiera at Porto di Trieste, 314° for 10 miles.

From a position 2.5 miles westward of Punta Salvore, 026° for 15 miles until Punta Sdobba Light structure bears 241° , distant 1.5 miles, whence 314° for 2.6 miles.

From a position 6 miles eastward of Punta della Maestra Lighthouse (eastern mouth of Fiume Po della Pila), 048° for 53.5 miles to a position with Banco Mula di Muggia Light structure bearing 293° , distant 3.8 miles, whence 031° for 7 miles to a position with Punta Sdobba Light structure bearing 241° , distant 1.5 miles, whence 314° for 2.6 miles.

From the entrance buoy at Porto di Lido, 072° for 46 miles to a position with Banco Mula di Muggia Light structure bearing 293° , distant 3.8 miles, whence 031° for 7 miles to a position with Punta Sdobba Light structure bearing 241° , distant 1.5 miles, whence 314° for 2.6 miles.

CURRENT

6A-11 The coastal current is negligible.

An out-going current is usually experienced in the entrance channel but is of insufficient velocity to affect maneuvering.

Eddies and a surface counter current sometimes occur in the vicinity of Banchina Solvay in Porto Rosega. Disturbance by subterranean springs has been noted.

DEPTHS

6A-12 The entrance channel has a controlling depth of 28 feet. In Porto Rosega the depths vary from 16 to 32 feet. Although depths in Bacini di Panzano range from 6 to 59 feet, and the alongside depths at the facilities in Bacino I are from 20 to 38 feet, the only part usable by ocean-going vessels has a dredged channel with a depth of 17

feet. The fairway of Canale Valentinis has a controlling depth of 2.7m (9 ft.). The depths in Bacino Nazario Sauro at the head of Canale Valentinis are 1.8m (6 ft.) to 4.2m (14 ft.)

See caution note in channel description, section 6A-15.

LANDMARKS

6A-13 The principal prominent landmarks visible in the vicinity of Porto di Monfalcone are: the castle and houses of Duino (sec. 6A-8), Cippo Randaccio which appears as a white mark slightly elevated above the mouth of and on the western bank of Fiume Timavo; the ruins of the ancient fortification of San Marco standing on a bare hill close northeastward of Monfalcone; the large chemical works with four conspicuous chimneys eastward of Porto Rosega; the shipyard on the western side of Porto Rosega; and the range light structures of the harbor entrance.

ANCHORAGE

6A-14 Large vessels anchor about 1 mile southwestward of Duino in 10m (5 1/2 fm) small vessels anchor farther inshore. The bottom in the center of Baia di Panzano is sand and mud; that near the shore is mud.

HARBOR

6A-15 The harbor is entered between Penisola di Panzano to westward and the mainland to eastward through an entrance about 80 yards wide.

Entrance channel.—The port is approached through a narrow channel about 1 1/4 miles long, marked by four buoys, eight concrete pile beacons, and two lights in range $158\frac{1}{2}^{\circ}$ — $338\frac{1}{2}^{\circ}$. The channel in 1951 had a controlling depth of 8.5m (28 ft.). The outer eastern side of the entrance channel is shoaling and the greatest caution should be exercised in its navigation; deep draft vessels should favor slightly the western side of the range between the tow outer channel buoys and a position about 550 yards northward.

The front range light is shown from the head of the shipyard mole. The rear range light is shown from an aviation tower.

Lights are shown from two beacons on the inner eastern part of the channel. A fog signal is sounded at the beacon located eastward of the front range light.

The entrance to the channel is marked by a light buoy, painted in red and black stripes and showing a flashing white light, situated on the range about 1 1/2 miles from the front range structure.

Porto Rosega consists of a basin about 1/2 mile long in a northwest-southeast direction and about 220 yards wide, entered northward of the entrance to the harbor. The sides of the basin are, for the most part, quayed. A chemical works lie on the eastern side of the basin and the installations of the shipyard occupy the majority of the western side, which for the most part is fronted by quays.

In 1968, extensive harbor works were in progress to enlarge the quays at the northern end of Porto Rosega. Canale Vecchio, the old entrance to the harbor but now disused, leads south-southeastward from the southeastern part of Porto Rosega and is used as a shallow depth basin.

Bacini di Panzano is an artificially developed uncompleted harbor lying northwestward of Penisola di Panzano and is entered between it and the southern extremity of the tongue of land occupied by the shipyard. It consists of three basins formed by two projections extending from the northwestern side. The basins are numbered I, II, and III from east to west. Shoals extend from both sides of the entrance leaving an unmarked channel about 110 yards wide with a depth of 6.7m (22 ft.) in the fairway (1955) leading to the eastern part of Bacino I. Deep water exists in Bacini II and III but their entrances are obstructed by shallow water.

A submarine cable crosses the entrance of Bacini di Panzano, the landing places being marked by an inverted anchor painted on a wall.

Canale Valentinis leads northwestward for about 0.6 mile from the northern end of Porto Rosega. The width varies from 115 to 295

feet. In 1954, there were depths of 3m (10 ft.) to 3.9m (13 ft.) in the fairway and 2.4m (8 ft.) to 4.2m (14 ft.) in the basin. The eastern and part of the western sides are quayed.

Bacino Nazario Sauro, 985 feet long and 245 feet wide, is the northern termination of Canale Valentinis at the town of Monfalcone. Depths are from 1.8m (6 ft.) to 4.2m (14 ft.). The northern part is crossed by a bridge and receives the water from an irrigation and water power canal which produces a strong current especially alongside the quays.

PILOTAGE

6A-16 Pilotage is compulsory for vessels over 400 tons. Pilots board seaward of the entrance.

Vessels navigating in the channel or harbor should not exceed a speed of 5 knots (see sec. 1-20).

DIRECTIONS FOR ENTERING

6A-17 Approaching vessels may safely favor the northeastern side of Baia di Panzano and, in no case, steer for the entrance buoy on a bearing greater than 314°.

Port authorities prescribe that a vessel should anchor southeastward of the entrance buoy until assignment of berth.

FACILITIES

6A-18 Monfalcone, population about 20,000, is an important industrial town having considerable import and export trade. In addition to a thriving shipyard, the industries include a chemical works, manufacture of soda, tin plate, and the refining of oil, asphalt, and pitch. Fishing in the harbor and within 8 miles of the coast is seasonal. Imports are chiefly coal and lumber.

Berths—Porto Rosega.—Banchina Solvay, fronting the chemical works, has a length of 328 feet with an alongside depth of 6.4m (21 ft.). This berth is used only for the discharge of salt and coal to the works which is accomplished by two cranes of about 30 tons capacity each which feed a belt conveyor. Another quay continues northwestward of Banchina Solvay for 655 feet with a depth of less than 4.9m (16 ft.). Southeastward of Banchina Solvay is another quay with a length of 328 feet with depths of 3m (10 ft.) to 4.2m (14 ft.) alongside. These three berths have railway tracks connecting with Monfalcone.

There is 1,640 feet of berthing space at the quays of the shipyard used only for vessels under repair and those discharging cargo consigned to the yard. The alongside depths vary from 8.8m (29 ft.) to less than 4.9m (16 ft.) These berths have railway tracks

connecting with the station at Ronchi dei Legionari, 2 miles distant. The shipyard quays are equipped with a number of fixed and mobile cranes. Two floating cranes of 35 and 40 tons capacity, respectively, and about eight lighters are operated by the yard. The yard can also furnish two tugs of 120 and 70 horsepower, respectively. A 750 hp. tug is available from Grieste.

Bacini di Panzano.—The northeastern and northern sides of Bacino I are quayed or embanked and contain a few piers alongside all of which are depths of 6.1m (20 ft.) to 11.6m (38 ft.). There is a berth 325 feet long with a depth of 5.8m (19 ft.) on the northeastern side of Bacino II used by coastwise steamers, but to approach it vessels must traverse a shoal with 4.2m (14 ft.) of water over it.

Supplies.—Fresh provisions are available. Banchina Solvay and the quays at the shipyard are fitted with fresh water connections. A limited stock of coal is stored.

Repairs to hull and machinery are unrestricted. There is a steel floating dock of the following dimensions: length, 229.6 feet; inside breadth, 67.3 feet; depth over blocks, 6.4m (21 ft.); lifting capacity, 1,200 tons, located in Bacino I. Divers are available.

Communications.—There is a railway station and motor service to adjacent towns. A regular steamer service is maintained to Porto di Trieste.

Medical.—There is a civil hospital.

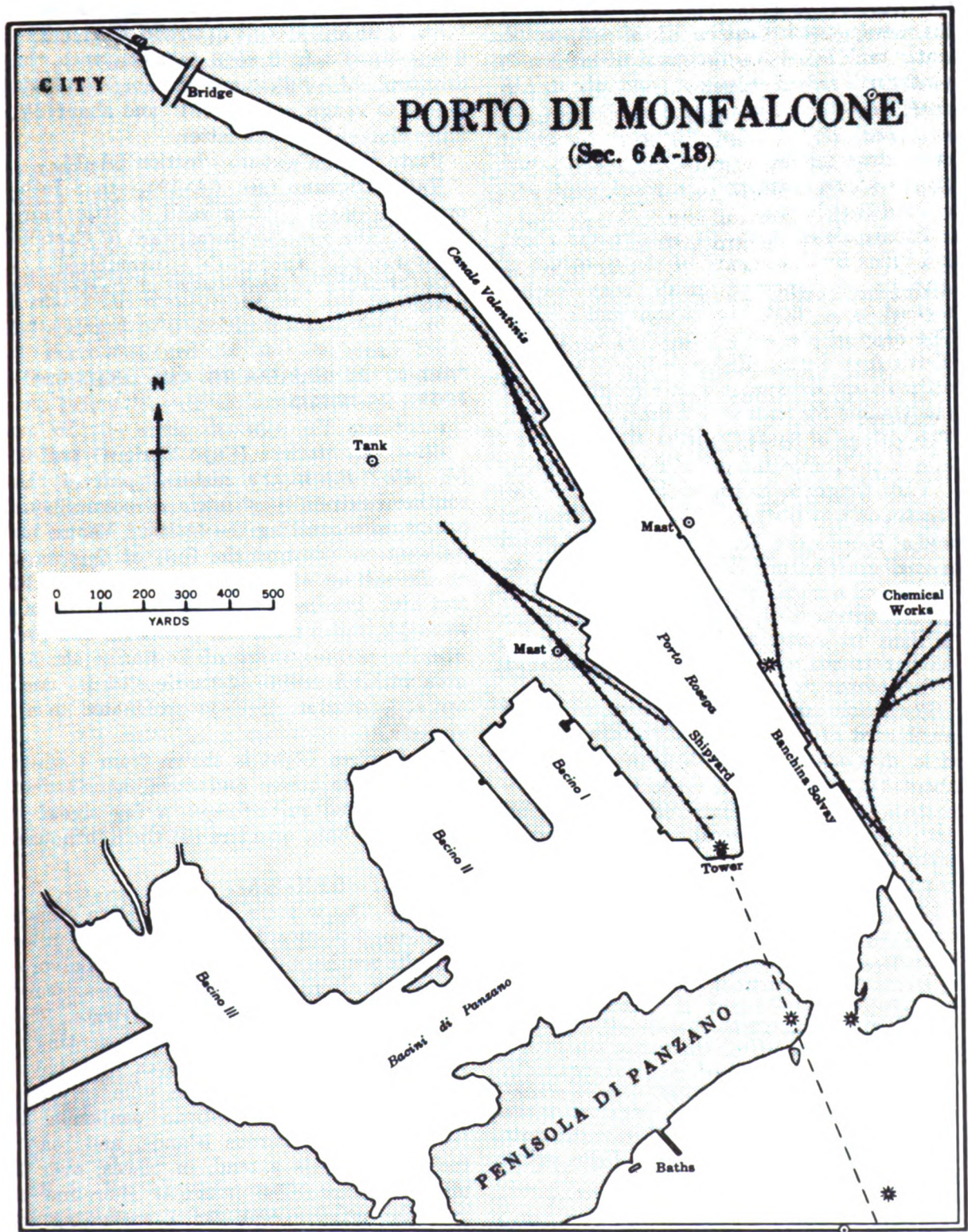
LANDMARKS—COASTAL FEATURES (Continued)

6A-19 Sistiana (45°46' N., 13°38' E.) is a village situated at the head of a cove, 1¼ miles eastward of Duino. The cove is ringed by a series of green hills with conspicuous stone quarries. Two short breakwaters provide a harbor for small craft, one projecting from each entrance point of the cove. There is a pier about 200 feet long, with depths of 4.2m (14 ft.) to 4.9m (16 ft.) alongside, in the northern part of the harbor, and a mole in the southeastern corner of the cove with a depth of 3.3m (11 ft.) at its head. The head of each breakwater is marked by a light.

A wharf, about 50 yards long with a pier extending from it, is located about ¼ mile eastward of Sistiana at a quarry. The depth at the pierhead is about 3m (10 ft.).

Vessels must not exceed a speed of 6 knots in the harbor when passing the stone quarries in the vicinity.

From Sistiana the coast, which is high and steep, trends 5 miles southeastward to a



rocky projection of the coast on which stands the conspicuous **Castello di Miramare**. A water tank stands on the coast about 1 mile southeastward of **Sistiana**, and about $1\frac{1}{2}$ miles farther southeastward is situated the prominent aqueduct of **Aurisina**. A tower rises close inland above the aqueduct, and on the shore fronting it, a short mole provides a boat harbor.

Porticciolo di Santa Croce, situated about $1\frac{1}{2}$ miles southeastward of the aqueduct of **Aurisina**, is another small boat harbor formed by a short breakwater and a mole. The head of the mole is marked by a light shown from a post. Entrance into the port is difficult and dangerous with a rough sea and inadvisable for craft with a draft over 6 feet. The village of **Santa Croce** is situated on an elevation $\frac{1}{2}$ mile inland of the boat harbor.

Valle Grignano lies northward of the projection on which stands **Castello di Miramare** and at the eastern side of the bight is located a small craft harbor formed by a short breakwater and a mole. There is a depth of about 15 feet at the head of the mole from which a light is shown from a post. The inner harbor is quayed; there are depths of about 6 feet alongside.

Porticciolo di Miramare, situated close southward of **Castello di Miramare**, **Porticciolo di Cedas** and **Porticciolo di Barcolo**, about $1\frac{1}{4}$ and 2 miles, respectively, southeastward are suitable only for boats drawing less than 6 feet. A light is shown from the head of the mole at **Porticciolo di Barcolo**, and one on the head of the southern breakwater at **Porticciolo di Cedas**.

A naval practice area, $1\frac{3}{4}$ miles wide, extends about 6 miles offshore southwestward of **Castello di Miramare**.

6A-20 Vittoria Light is shown from a white cylindrical stone monument, 223 feet high, situated on a hill 175 yards inland of a position $\frac{1}{2}$ mile south-southeastward of **Porticciolo di Barcolo**. A radiobeacon transmits from **Vittoria Light**. The northern extremity of **Porto di Trieste** lies 0.6 mile south-southeastward of **Vittorio Light** and is described in section **6B-47**.

ANCHORAGES

6A-21 Porto Lignano (sec. **6A-6**).—In $5\frac{1}{2}$ fathoms over mud about 2 miles southeastward of the entrance.

Morgo, the name of the anchorage between **Porto Buso** and **Marina di Grado**, section **6A-6** and **6A-7**.—In 5 to 6 fathoms with the campanile of **Aquileia** and the house on **Isola Morgo** in range bearing 031° and about $2\frac{1}{4}$ miles distant from the latter.

Porto di Monfalcone.—Section **6A-14**.

Valle Grignano (sec. **6A-19**).—In 8 fathoms over good holding sand a little more than $\frac{1}{2}$ mile west-northwestward of **Castello di Miramare**. Anchorage is prohibited $\frac{1}{2}$ mile offshore southeastward of **Castello di Miramare**.

PART B. RT MARLERA TO AND INCLUDING PORTO DI TRIESTE

6B-1 Rt Marlera (Capo Merlera) ($44^\circ 48' N.$, $14^\circ 00' E.$) is the eastern point of the southern extremity of **Istria**, a mountainous peninsula separating the **Gulf of Venice** on its western side and the **Gulf of Quarnaro** on its eastern side. The cape which is 69 feet high, bare, and steep-to, juts southeastward $1\frac{3}{4}$ miles from the peninsula and lies 4 miles northeastward of **Rt Kamenjak**. An area within a radius of 1 mile with its center at **Rt Marlera light** is prohibited to all vessels.

Rt Marlera Light is shown from a white square stone tower and dwelling, 31 feet high, situated on the cape. A fog signal is sounded by hand on a siren at the lighthouse.

COAST—GENERAL

6B-2 The western coast of **Istria** trends north-northwestward approximately 50 miles from its southern extremity to **Capo Salvore**, whence it alters direction to northeastward for about 12 miles to **Porto di Trieste**. The coastline is profusely indented, presenting a continuous succession of coves and bays, nearly all of which contain villages. The western side of the **Istrian peninsula** is fronted with numerous islands, and many rocks and shoals extend, in places, over 2 miles offshore. The irregular shoreline is generally bare except for a sprinkling of low green bushes. The land rises gradually from the shore to a dominating mountainous

ridge in undulating hills on which are numerous scattered villages, vineyards, olive and cedar groves. The northern coast is clear of off-lying islands and shoals and contains two large bays.

DANGERS

6B-3 The rocks and reefs fronting the western shoreline of Istria are too numerous to locate and describe individually, but the most important ones will be described with the shore off which they lie. No dangers exist seaward of positions 2 miles westward and northwestward of Rt Barbana, the northwestern point of Ostrvo Veliki Brioni (Isole Brioni Maggiore), and elsewhere seaward of the same distance off the main coastline.

A circular ammunition dumping area, 6 miles in diameter, lies about 16 miles westward of the breakwater at Luka Pula (sec. 6B-10); a circular danger area, with a diameter of about 6 miles, lies about 31 miles westward of the above breakwaters.

The northeastern corner of a rectangular artillery and submarine exercise area lies about $2\frac{1}{2}$ miles west-southwestward of the head of the breakwater at Luka Pula; it is about $11\frac{1}{2}$ miles long and about $8\frac{1}{2}$ miles wide.

A circular prohibited area, one mile in diameter, marked by a buoy, lies about $2\frac{1}{2}$ miles southwestward of Rt Verudica (sec. 6B-9).

PILOTAGE REGULATIONS

6B-4 Vessels desiring a pilot between Rt Kamenjak and Rijeka, should notify, by radio, the Port Authorities Office in Rijeka at least 24 hours in advance. The vessel should then proceed to the anchorage at Luka Pula where the pilot will board. If a pilot is taken for the return trip, he will disembark at the same place.

NAVIGATION

6B-5 Northbound coastal track.—The following described courses lead from the po-

sitions indicated to a position with Punta Lanterna Lighthouse (Capo Salvore) bearing 109° , distant 2.1 miles:

From close off Pličina Albanež (Secca Pericolosa) Lighthouse, 310° for 10.8 miles to a position with Rt Pinida Lighthouse bearing 040° , distant 3 miles, whence 330° for 13.4 miles to a position with Hrid Sveti Ivan (Scoglio San Giovanni in Pelago) Lighthouse bearing 090° , distant 2.7 miles, whence 350° for 27.8 miles.

From a position, to which previous mention has been made, 6 miles westward of Hrid Sveti Ivan (Scoglio San Giovanni in Pelago) Lighthouse, 357° for 27.5 miles.

To Porto di Trieste.—From a position with Punta Lanterna Lighthouse (Capo Salvore) bearing 109° , distant 2.1 miles, 026° for 1 mile to a position with Punta Lanterna Lighthouse bearing 139° , distant 2.3 miles, whence 056° for 14 miles to a position 1 mile westward of the head of Molo Fratelli Bandiera.

Along northern coast of Istria.—From the position with Punta Lanterna Lighthouse bearing 139° , distant 2.3 miles, a course may be laid to any position off the northern coast of Istria, providing the land is not closed nearer than 0.5 mile.

CURRENT, WIND, AND TIDE

6B-6 Current.—Between Rt Kamenjak (Capo Promontore) and Capo Salvore the current flows northward along the coast with a velocity of from 0.4 to 0.8 knots. With strong wind or wind of long duration, the velocity may increase to 1 or 2 knots for a short time.

Wind.—The bora is less violent along the western coast of Istria than in any other part of the Adriatic. With a southerly component, the bora is relatively stronger than with a northerly. When the bora blows in the Kvarner it seldom is felt northward of Rovinj, excepting in the valleys of Limski Kanal and Fiume Quieto. During such a

period this coast is often swept by strong cool northwesterly winds.

The scirocco blows strong in a direction parallel to the coast and is accompanied with reduced visibility.

Seas make up with southwesterly wind which also brings fog to the coast.

During the season of good weather, the wind alternates between a day breeze from the northwest and a land breeze at night.

Tide.—The normal tidal range is 2.2 feet but in exceptional cases it has reached about 5 feet.

LANDMARKS—COASTAL FEATURES

6B-7 Rt Kamenjak (Capo Promontore) ($44^{\circ}46' N.$, $13^{\circ}55' E.$), the southern extremity of Istria, is a narrow hilly point of land, 150 feet high northward of its extremity, projecting southward about 3 miles. The point is not well defined except in very clear weather. Vessels approaching from eastward will sight the campaniles of a number of hilltop villages together with the light-houses, whereas a vessel approaching from westward will sight, in addition to the light-houses, only the village of Premantura, about $2\frac{1}{2}$ miles northward of the extremity of the cape.

There is a signal station on the point for communication by International Code of Signals with vessels requesting pilotage service. (See sec. 6B-4.)

Hrid Porer (Scoglio Porer), a rock 23 feet

high, lies $1\frac{1}{2}$ miles west-southwestward of Rt Kamenjak and near the outer extremity of a reef extending southwestward from the western face of the cape. A beacon marks part of this reef.

Hrid Porer Light is shown from a white cylindrical stone tower on a dwelling, the whole 103 feet high, situated on the rock. A fog signal is sounded at the light.

Pličina Albanež (Secca Pericolosa), a rock with a depth of 9 feet over it, lies 2 miles south-southwestward of Rt Kamenjak.

Pličina Albanež Light is shown from a white cylindrical concrete tower, 61 feet high, situated on the rock. A detached rocky patch with a depth of 5 fathoms over it lies $\frac{1}{2}$ mile north-northwestward of Pličina Albanež. A dangerous wreck lies about $\frac{2}{5}$ mile southeastward of the tower.

Note.—When Pličina Albanež Light is extinguished, an alternate light with fixed white, red, and green sectors is shown from Hrid Porer light tower, at an elevation of 39 feet.

6B-8 Medulinski Zaliv (Baia di Medolino) is entered between Rt Kamenjak on its southwestern side and Rt Marlera on its northeastern side. The gulf is divided into an inner and outer bay by Rt Kasteja, the extremity of a low peninsula jutting southward from the northeastern side of the bay, which forms with Rt Munat, about 425 yards westward, a narrow entrance. The inner bay is shallow and available only for small craft. The outer bay contains several

islets and rocks which together with the indented shores of the bay are bordered by reefs and shoals. Otocic Finera, the outermost islet, lies about 1 mile eastward of Rt Kamenjak and is marked by a beacon. Several beacons mark reefs in the western part of the bay.

A light is shown from a post, 18 feet high, alongside a concrete hut situated on Rt Munat. The white sector of this light between the bearings of 312° and 327° leads through the principal passage in the outer bay between Otočić Ceja and Bodulaš.

6B-9 The coast between Rt Kamenjak and Rt Kumpare (Capo Compare), 8½ miles northwestward, consists of an irregular hilly shoreline indented by numerous coves accessible to small vessels only.

Luka Veruda (Porto Veruda), the most important bay along this stretch of coast, is entered between Rt Verudica (Punta Verudella) and Ostrvo Veruda (Isolotto Veruda), 5½ miles northwestward of Rt Kamenjak and consists of two inlets. The northern inlet offers an anchorage in about 6 fathoms over hard mud for a small vessel. A light is shown from a turret, 26 feet high, at the corner of a white building situated on Rt Verudica, the northern entrance point of the bay. A conical buoy is moored a little less than 1 mile northwestward of the light structure.

The description of the coast northward of Luka Pula is continued in section 6B-19.

LUKA PULA (RADA DI POLA)

Position: 44°53' N., 13°48' E.

Depths:

Outer harbor, 12 to 20 fathoms.

Inner harbor, 5½ to 15 fathoms.

Quays, 8 to 26 feet.

Tide: Diurnal range, 1.7 feet.

Port plan: Section 6B-18.

6B-10 Luka Pula, essentially a naval base, is an almost landlocked basin surrounded by hills. It is entered between Rt Kumpare, 3 miles northwestward of Rt Ver-

udica, on its southern side, Rt Krišto, about 1,600 yards northward, on its northern side, and Rt Pinida, the southern extremity of Ostrvo Veliki Brioni (sec. 6B-19), about 1¾ miles northwestward of Rt Kumpare, on its northwestern side. The entrance is narrowed to a width of about 560 yards by a breakwater extending 1,280 yards north-northwestward from Rt Kumpare. The harbor is divided into an outer and inner part by two islets, Otočić Sveti Andrija and Otočić Sveta Katarina. The inner harbor is also divided into two parts by Otočić Uljanik.

CURRENT, WIND, AND TIDE

6B-11 Current.—The northwesterly coastal current, retarded or accelerated by the wind, is experienced in the approaches to the harbor. Within the harbor tidal currents only are felt.

Wind.—The bora and scirocco are prevalent during winter. The former, sometimes violent, always lasts for three or more days but is seldom felt with force in the inner harbor.

Tide.—The tide is chiefly diurnal; the diurnal range is 1.9 feet. The scirocco raises the water in the harbor, but both the bora and northwest winds lower it, the range can be as much as 6.5 feet.

DEPTHS

6B-12 Depths in the outer harbor, clear of the shore's narrow bordering shoal and the heads of the several coves, vary from 20 fathoms at the entrance to about 12 fathoms southward of Otočić Sveta Andrija. Off-shore depths in the inner harbor vary from 5½ to 15 fathoms; the eastern side of the northeastern part of the inner harbor is shallow.

LANDMARKS

6B-13 The land about Pula generally is not high and the only prominent points near the entrance are Rt Kumpare and a steep

point, 266 feet high, 1 mile south-southeastward. The latter is the first rather high land northward of Rt Kamenjak. Conspicuous forts stand on the summits of the hills surrounding the harbor.

ANCHORAGE

6B-14 The harbor has sufficient size for seven anchorage berths, 600 yards in diameter, in $6\frac{1}{2}$ to 19 fathoms. A larger number of small vessels can be accommodated. The bottom is good holding mud. Permission for and location of anchoring should be obtained from the naval authorities.

There are a number of mooring buoys in the outer and inner harbors.

Prohibited anchorage.—Anchorage is prohibited northward of a line between Rt Pinida and Rt Kumpare, and southward of a line between Rt Rankon and the mainland about $1\frac{1}{4}$ miles east-southeastward of Otočić Sveta Katarina, to the opposite shore.

HARBOR

6B-15 The outer harbor is about $1\frac{1}{2}$ miles long in a northwest-southeast direction and, within the breakwater, has a minimum width of about 850 yards. Portions of the outer end of the breakwater are destroyed. The shores of the outer harbor are indented with several coves and are fronted by a shoal with depths of less than 5 fathoms, 100 yards wide in some places, on which are scattered rocks. The coves on the southern shore contain several quays and moles. The cove at the root of the breakwater is protected to eastward by a short breakwater.

From the eastern side of a cove on the northeastern shore, entered about 1 mile southeastward of Rt Krišto, an oil fueling pier, with a depth of 28 feet at its head extends about 100 yards west-northwestward. A number of oil storage tanks line the shore of this cove.

Lights.—A light is shown from a red iron post on a cylindrical hut on Rt Kristo. There is a signal station at the light structure.

The head of the breakwater is marked by

a light shown from a red iron tower, 15 feet high.

A signal station located at a fort atop a hill, $\frac{3}{4}$ mile south-southeastward of Rt Kumpare, is available for naval and commercial communication. Merchant vessels entering the port must signal their name and last port of call.

The inner harbor is about 1 mile long in a northeast-southwest direction and has a minimum deep water width of about 400 yards. Otočić Uljanik (Isolotto Olivi) and the bridge joining it to the town east-southeastward, divides the inner harbor into two parts. The southern portion of this harbor is reserved usually for naval vessels, and the northern portion for merchant vessels.

The passage for large vessels into the inner harbor, about 450 yards wide, lies between Otočić Sveti Andrija, situated in about the middle of the port, and Poluotočić Sveti Petar (Penisola di San Pietro), which projects about 340 yards northward from the southern shore. Otočić Sveti Andrija together with Otočić Sveta Katarina, close north-northwestward, lie on a shoal with depths of less than 5 fathoms that extends from the northern shore. The latter islet is connected west-northwestward by a causeway to a small peninsula projecting from the northern shore.

A passage between Otočić Sveti Andrija and Otočić Sveta Katarina has been dredged to a depth of 23 feet for a width of 40 yards and is marked by four lights shown from cylindrical iron towers, 16 feet high; the two on the northern side are painted red and the two on the southern side, black.

Numerous short piers extend off the northern shore of the inner harbor; their use is restricted generally to naval craft.

Otočić Uljanik, about 400 yards in diameter, occupies a central position in the inner harbor and is connected to the town east-southeastward by a swing bridge which is opened for vessels proceeding to the commercial harbor. This islet is the site of a shipyard and contains two large roofed build-

ing ways, three drydocks, two floating drydocks, and four marine railways.

Plicina Uljanik, rocky, extends about 400 yards east-northeastward from Otocio Uljanik. This reef is marked on each of its cardinal points by a conical BUOY.

The commercial harbor lies between the bridge to Otocio Uljanik and the railway station, 1,150 yards north-northeastward. The eastern shore of the harbor is quayed and there are two moles; Gat Rijeka, at about midway between the bridge and the station, and Gat Sveti Toma, at about midway between the bridge and the other mole.

The naval arsenal is located on the shore of the southern part of the inner harbor between the bridge and Poluotocio Sveti Petar.

LEGHTS.—The southern extremity of Otocio Sveti Andrija is marked by a light.

A **LIGHT** is shown close north-northeastward of Otocio Uljanik.

The head of Gat Rijeka is marked by a light.

A **LIGHT** is shown from the head of Gat Sveti Toma.

PILOTAGE

6B-16 Pilotage is compulsory; pilots board vessels near the breakwater entrance and are available day and night.

DIRECTIONS FOR ENTERING

6B-17 By day, the landmarks previously described and Ostrvo Veliki Brioni will serve to guide a vessel to the entrance from a position on the coastal track with Et Pinida Lighthouse bearing 040°, distant 3 miles. By night, the lights on Et Pinida, on the head of the breakwater, and on Et Kristo will serve similarly. A vessel should pass between the outer end of the breakwater and Et Kristo, giving the latter a berth of at least 100 yards, whence the vessel should be headed toward Poluotocio Sveti Petar bringing the light thereon or the northern extremity of the northwesternmost building bearing 131°. Upon approaching Otocio Sveti Andrija, the vessel should shape course to pass between it and Poluotocio Sveti Petar, thereafter turning southward to the arsenal, or northward between Otocio An-

drija and Otocio Uljanik if bound to the northern anchorage or to the moles in the commercial harbor.

FACILITIES

6B-18 Pula is built on the southeastern side of the inner harbor and is one of the most ancient towns in Istria. Several interesting Roman remains are still visible, particularly the amphitheatre with conspicuous high and well preserved walls; situated close eastward of Gat Sveti Toma. The population is about 35,000.

The importance of Pula derives principally from its used as a naval base.

There is a moderate maritime trade; exports are bauxite, flint, cement, wine, and fruit; the imports are mostly foodstuffs.

Gat Rijeka is about 460 feet long on its northern side and about 490 feet on its southern side. The depths along both sides are 12 to 26 feet.

The quay, extending southward of Gat Rijeka, is 440 feet long with 11 1/2 to 19 1/2 feet alongside.

A quay, extends 1,800 feet west-southwestward of the southern end of the above quay, has 8 to 19 1/2 feet alongside.

Gat Sveti Toma, a pier extending from near the center of the above quay is 230 feet long with 13 to 24 1/2 feet alongside.

Poluotocio Sveti Petar, has 2,080 feet of berthing length with 8 to 23 feet alongside and 245 feet with 26 feet alongside.

Several tugs, cranes, and lighters are available.

SUPPLIES.—Provisions are available. Fuel oil and water can be obtained.

REPAIRS.—Major repairs can be made at the shipyard. The dimensions of the largest drydock are: length, 546 feet; width, 171.3 feet, depth over sill, 7.9 feet.

COMMUNICATIONS.—Pula is connected to the general railway system of the continent. There is regular steamer service with other Adriatic ports.

There is a radio station.

HOSPITAL.—There is a hospital to which seamen are admitted.

DERATTING.—Deratting can be carried out and Deratting Certificates and Deratting Exemption Certificates issued.

point, 266 feet high, 1 mile south-southeastward. The latter is the first rather high land northward of Rt Kamenjak. Conspicuous forts stand on the summits of the hills surrounding the harbor.

ANCHORAGE

6B-14 The harbor has sufficient size for seven anchorage berths, 600 yards in diameter, in $6\frac{1}{2}$ to 19 fathoms. A larger number of small vessels can be accommodated. The bottom is good holding mud. Permission for and location of anchoring should be obtained from the naval authorities.

There are a number of mooring buoys in the outer and inner harbors.

Prohibited anchorage.—Anchorage is prohibited northward of a line between Rt Pinida and Rt Kumpare, and southward of a line between Rt Rankon and the mainland about $1\frac{1}{4}$ miles east-southeastward of Otočić Sveta Katarina, to the opposite shore.

HARBOR

6B-15 The outer harbor is about $1\frac{1}{2}$ miles long in a northwest-southeast direction and, within the breakwater, has a minimum width of about 850 yards. Portions of the outer end of the breakwater are destroyed. The shores of the outer harbor are indented with several coves and are fronted by a shoal with depths of less than 5 fathoms, 100 yards wide in some places, on which are scattered rocks. The coves on the southern shore contain several quays and moles. The cove at the root of the breakwater is protected to eastward by a short breakwater.

From the eastern side of a cove on the northeastern shore, entered about 1 mile southeastward of Rt Krišto, an oil fueling pier, with a depth of 28 feet at its head extends about 100 yards west-northwestward. A number of oil storage tanks line the shore of this cove.

Lights.—A light is shown from a red iron post on a cylindrical hut on Rt Kristo. There is a signal station at the light structure.

The head of the breakwater is marked by

a light shown from a red iron tower, 15 feet high.

A signal station located at a fort atop a hill, $\frac{3}{4}$ mile south-southeastward of Rt Kumpare, is available for naval and commercial communication. Merchant vessels entering the port must signal their name and last port of call.

The inner harbor is about 1 mile long in a northeast-southwest direction and has a minimum deep water width of about 400 yards. Otočić Uljanik (Isolotto Olivi) and the bridge joining it to the town east-southeastward, divides the inner harbor into two parts. The southern portion of this harbor is reserved usually for naval vessels, and the northern portion for merchant vessels.

The passage for large vessels into the inner harbor, about 450 yards wide, lies between Otočić Sveti Andrija, situated in about the middle of the port, and Poluotočić Sveti Petar (Penisola di San Pietro), which projects about 340 yards northward from the southern shore. Otočić Sveti Andrija together with Otočić Sveta Katarina, close north-northwestward, lie on a shoal with depths of less than 5 fathoms that extends from the northern shore. The latter islet is connected west-northwestward by a causeway to a small peninsula projecting from the northern shore.

A passage between Otočić Sveti Andrija and Otočić Sveta Katarina has been dredged to a depth of 23 feet for a width of 40 yards and is marked by four lights shown from cylindrical iron towers, 16 feet high; the two on the northern side are painted red and the two on the southern side, black.

Numerous short piers extend off the northern shore of the inner harbor; their use is restricted generally to naval craft.

Otočić Uljanik, about 400 yards in diameter, occupies a central position in the inner harbor and is connected to the town east-southeastward by a swing bridge which is opened for vessels proceeding to the commercial harbor. This islet is the site of a shipyard and contains two large roofed build-

ing ways, three drydocks, two floating drydocks, and four marine railways.

Plicina Uljanik, rocky, extends about 400 yards east-northeastward from Otocic Uljanik. This reef is marked on each of its cardinal points by a conical BUOY.

The commercial harbor lies between the bridge to Otocic Uljanik and the railway station, 1,150 yards north-northeastward. The eastern shore of the harbor is quayed and there are two moles; Gat Rijeka, at about midway between the bridge and the station, and Gat Sveti Toma, at about midway between the bridge and the other mole.

The naval arsenal is located on the shore of the southern part of the inner harbor between the bridge and Poluotocic Sveti Petar.

LIGHTS.—The southern extremity of Otocic Sveti Andrija is marked by a light.

A **LIGHT** is shown close north-northeastward of Otocic Uljanik.

The head of Gat Rijeka is marked by a light.

A **LIGHT** is shown from the head of Gat Sveti Toma.

PILOTAGE

6B-16 Pilotage is compulsory; pilots board vessels near the breakwater entrance and are available day and night.

DIRECTIONS FOR ENTERING

6B-17 By day, the landmarks previously described and Ostrvo Veliki Brioni will serve to guide a vessel to the entrance from a position on the coastal track with Rt Pinida Lighthouse bearing 040°, distant 3 miles. By night, the lights on Rt Pinida, on the head of the breakwater, and on Rt Kristo will serve similarly. A vessel should pass between the outer end of the breakwater and Rt Kristo, giving the latter a berth of at least 100 yards, whence the vessel should be headed toward Poluotocic Sveti Petar bringing the light thereon or the northern extremity of the northwesternmost building bearing 131°. Upon approaching Otocic Sveti Andrija, the vessel should shape course to pass between it and Poluotocic Sveti Petar, thereafter turning southward to the arsenal, or northward between Otocic An-

drija and Otocic Uljanik if bound to the northern anchorage or to the moles in the commercial harbor.

FACILITIES

6B-18 Pula is built on the southeastern side of the inner harbor and is one of the most ancient towns in Istria. Several interesting Roman remains are still visible, particularly the amphitheatre with conspicuous high and well preserved walls; situated close eastward of Gat Sveti Toma. The population is about 35,000.

The importance of Pula derives principally from its used as a naval base.

There is a moderate maritime trade; exports are bauxite, flint, cement, wine, and fruit; the imports are mostly foodstuffs.

Gat Rijeka is about 460 feet long on its northern side and about 490 feet on its southern side. The depths along both sides are 12 to 26 feet.

The quay, extending southward of Gat Rijeka, is 440 feet long with 11 1/2 to 19 1/2 feet alongside.

A quay, extends 1,800 feet west-southwestward of the southern end of the above quay, has 8 to 19 1/2 feet alongside.

Gat Sveti: Toma, a pier extending from near the center of the above quay is 230 feet long with 13 to 24 1/2 feet alongside.

Poluotocic Svet: Petar, has 2,080 feet of berthing length with 8 to 23 feet alongside and 245 feet with 26 feet alongside.

Several tugs, cranes, and lighters are available.

SUPPLIES.—Provisions are available. Fuel oil and water can be obtained.

REPAIRS.—Major repairs can be made at the shipyard. The dimensions of the largest drydock are: length, 546 feet; width, 171.3 feet, depth over sill, 7.9 feet.

COMMUNICATIONS.—Pula is connected to the general railway system of the continent. There is regular steamer service with other Adriatic ports.

There is a radio station.

HOSPITAL.—There is a hospital to which seamen are admitted.

DERATTING.—Deratting can be carried out and Deratting Certificates and Deratting Exemption Certificates issued.

OFF-LYING ISLANDS

6B-19 BRIONSKI OTOCI (SOLE BRIONI) (44°55' N., 13°45' E.). This group of islands, about 4 miles long in a northwest-southeast direction, lies close northwestward of the entrance to Luka Pula, parallel with the coast and separated from it by Fazana Kanal (Canale di Fasana). The islands are composed of marble covered with thick bush and low trees and range in height from 20 to 189 feet. Numerous islets, rocks, and reefs lie westward and northwestward for a distance of 1 1/2 miles from the two principal islands, **OSTRVO MALI BRIONI (SOLA BRIONI MINORE)** to northward and **OSTRVO VELIKI BRIONI (SOLA BRIONI MAGGIORE)** to southward. The former and smaller island has a prominent stone quarry, and on the summit of the latter and larger island, 189 feet high, there is a conspicuous fort.

ET PINIDA (PUNTA PENEDA), the southern extremity of the larger island, is marked by a light. A **FOG SIGNAL** is sounded at the lighthouse. Several brilliant lights are visible near the lighthouse.

A **WRECK** with 8 fathoms of water over it lies about 8 miles west-northwestward of Et Pinida. **ANOTHER WRECK**, lies about 1 3/4 miles west-northwestward of Greben Kabula.

GREBEN KABULA (SCOGLIO CABULA), 1 mile west-northwestward of the northwestern extremity of Ostrvo Mali Brioni, is marked by a light.

FAZANSKI KANAL (CANALE DI FASANA)

6B-20 Passage through **FAZANSKI KANAL** and within 1 mile of Brionski Otoi is prohibited to all vessels.

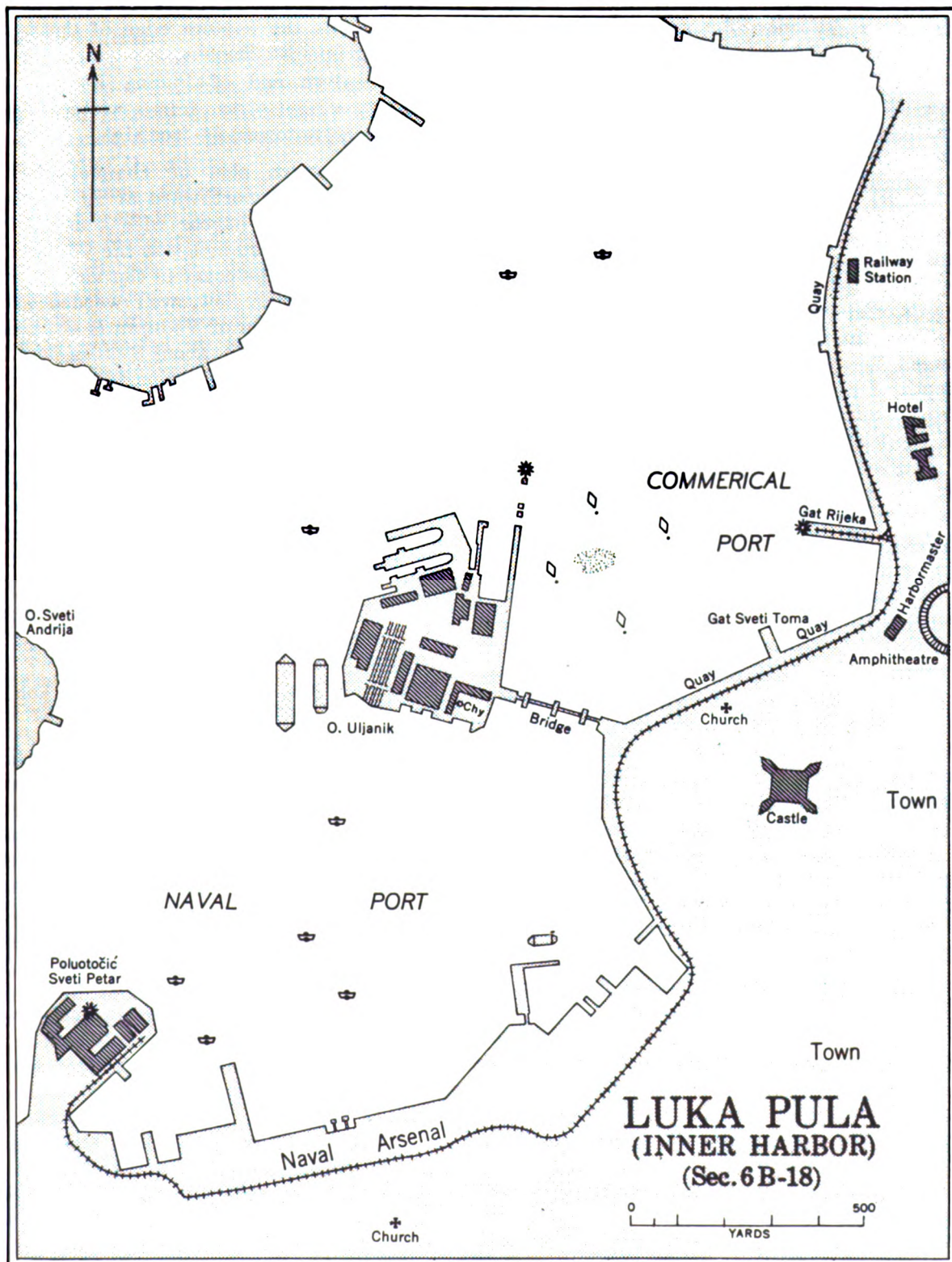
Fazanski Kanal lies between the mainland from Et Kristo (44°53' N., 13°48' E.) to Et Barbariga, 6 miles north-northwestward, on its eastern side, and Brionski Otoi, on its western side. A least depth of 34 feet exists

in the fairway of the narrowest part, about 350 yards wide, but with extreme care a least depth of 39 feet can be obtained. The channel is entered from southward between Et Kristo, on the eastern side, and Et Pinida, on the western side. Otoiic Sveti Jerolim, Otoiic Kozada, and Plicina Kozada lie nearly in mid-channel at the southern part; the best route lies westward of these three. Fazanski Kanal is entered from northwestward between Et Barbariga, on its northeastern side, and Greben Kabula, on its southwestern side. The southern part of Fazanski Kanal consists of bed rock uniting Brionski Otoi to the mainland and is bad holding ground. In the northern part a considerable number of vessels of any size can find shelter from all but northwesterly winds; there are, however, in this part of the channel several rocky patches covered with a thin layer of mud and weed, and vessels should anchor with caution.

CURRENT.—The normal coastal current is northwesterly but its direction and rate are considerably affected by wind and the tide; the northwesterly tidal current sometimes attains a rate of 2 1/2 knots; the southeasterly tidal current is weaker. In the narrows the currents are stronger, and when wind and tide are in the same direction, occasionally attain a rate of 3 knots.

EASTERN SIDE OF CHANNEL.—The eastern side of Fazanski Kanal, from about 400 yards north-northeastward of Et Kristo to Et Barbariga, is bordered by a shallow reef from 200 to 400 yards wide. Between Et Kristo and Fazana, 2 1/4 miles northward, are several coves. One close northward of Et Runci, 1 1/4 miles north-northeastward of Et Kristo, is crossed by an embankment.

OTOCIC SVETI JEROLIM, situated a little more than 1/2 mile northwestward of Et Kristo, consists of two hills, the higher and northwestern one being 56 feet high. The islet is bordered by a shallow reef, 80 yards wide in



some places, and lies on the southwestern end of a rocky ledge with depths of less than 6 fathoms which extends from the mainland coast. There is a quarry with steep sides on the islet which is particularly conspicuous from southwestward. A short pier with a depth of 13 feet at its head projects from the northern side of the islet.

Otočić Kozada, 30 feet high and surrounded by a reef 160 yards wide in places, lies on the same rocky ledge about 400 yards eastward of Otočić Sveti Jerolim and 500 yards offshore. There is a least depth of $5\frac{1}{2}$ fathoms in the fairway of the passage between the two islets. A short pier with a depth of about 10 feet in its head projects from a quayed area on the northeastern side of the islet.

Western side of channel.—Between Rt. Pinida and Rt Rankon, $1\frac{3}{4}$ miles northeastward, the southeastern side of Ostrvo Veliki Brioni is indented by three coves which are not suitable for anchorages.

Rt Rankon is bordered for 300 yards eastward and 400 yards northeastward by a reef with depths of less than 5 fathoms.

Pličina Kozada, a reef with a least depth of 12 feet, lies about 900 yards eastward of Rt Rankon. This reef is joined to the shore northeastward by a ridge over which there are depths of 26 feet; depths of less than 30 feet extend about 200 yards southwestward from the light tower marking the reef.

6B-21 Lights and buoy in the southern part of Fažanski Kanal.—The light on Rt Pinida is described in sec. 6B-19.

The light on Rt Krišto is described in section 6B-15.

A light is shown on the western point of Otocić Sveti Jerolim.

A light buoy, painted red above and white below, marks the eastern edge of the reef extending from Rt. Rankon.

The western end of Pličina Kozada is marked by a light shown from a white cylindrical concrete tower, 24 feet high.

6B-22 Eastern side of channel.—Luka Fažana, $2\frac{1}{4}$ miles northward of Rt Krišto, consists of a small harbor with a depth of 6 feet formed by two moles at the village of the same name. The coast in the vicinity of Fažana is generally low, well wooded and cultivated. The town of Vodnjan is situated on a hill, 443 feet high, about 3 miles northeastward of Fažana and helps to point out the position of the harbor. The head of each mole is marked by a light shown from a post, 16 feet high. The reef bordering the shore southward of the harbor entrance is marked on its western side by a black conical buoy.

Rt Mrtulin lies $1\frac{3}{4}$ miles north-northwestward of Fažana. Plicina Mrtulin with a depth of $10\frac{1}{2}$ feet lies about $\frac{1}{2}$ mile west-southwestward of Rt Mrtulin. This reef is marked by a spherical buoy, painted in red and black bands.

A 52-foot patch has been reported about $2\frac{1}{4}$ miles west-northwestward of Rt Mrtulin.

About midway between Rt Mrtulin and Rt Barbariga, 3 miles north-northwestward, are two conspicuous limekilns, the northern red and the other gray. Rt Barbariga is low and a shallow reef extends about 200 yards off it. A short pier projects southeastward from this point.

Western side of channel.—Uvala Kadena is entered between Rt Rankon and Rt Kadena, $\frac{1}{2}$ mile north-northwestward. Between Rt Kadena and Rt Saluga, 700 yards north-

ward, there is a conspicuous bathing pavilion with two turrets.

Rt Saluga Light ($44^{\circ}55' N.$, $13^{\circ}47' E.$) is shown from a cylindrical iron tower, 28 feet high and painted in black and white horizontal bands, situated about 200 yards north-eastward of the point.

Luka Brioni is entered between Rt Saluga and Rt Karne, $\frac{1}{2}$ mile west-northwestward. A shallow reef extends 200 yards northward from Rt Saluga, and depths of less than 5 fathoms extend about 600 yards off Rt Karne. At the head of the inlet there is a harbor protected by two breakwaters, the heads of which are about 175 yards apart. The harbor has depths of 10 to 19 feet. The village of Brioni in which are located some conspicuous buildings is situated on the shore of the harbor. Small vessels can secure to the northern breakwater or to a small mole which projects from the quay in the harbor. There are several mooring buoys off this port. The head of the northern breakwater is marked by a light shown from a black post, 20 feet high.

Between Rt Karne and Rt Barbana, the northwestern extremity of Ostrvo Veliki Brioni, about $1\frac{1}{4}$ miles west-northwestward, the coast is bordered by a narrow shallow reef. A passage, the bottom of which is rock and in the fairway of which there is a least depth of 8 feet, separates Ostrvo Veliki Brioni from Ostrvo Mali Brioni, northward, and is about 100 yards wide; this channel can be used by small vessels with local knowledge.

6B-23 Anchorages.—Vessels of any size can find good anchorage in Fažanski Kanal. The bora is frequently violent, and north-westerly winds cause a heavy sea.

Vessels can anchor in the vicinity of Luka Brioni, Fažana, and in Uvala Marić, about 1 mile eastward of Rt Bargariga, over good holding mud and sand. When choosing an anchorage care should be taken to avoid the numerous patches of rocky ground.

Prohibited anchorage.—Anchorage is prohibited in an area about 328 yards northward and about 1,039 yards southward of an axis that extends from Rt Saluga Light and the light on the southern mole at Fažana.

Anchorage is also prohibited in the southern part of the canal; see section 6B-14 for the limits of this area.

Unsuitable anchorages.—There are several areas unsuitable for anchorage where the bottom is rock covered by a thin layer of mud. One of these is in the southern part of the channel; another midway between the villages of Fažana and Brioni; two areas, at distances of about 1 and $1\frac{1}{4}$ miles, respectively, exist west-northwestward of Fažana; another about $\frac{3}{4}$ mile eastward of Rt Antelina, the southeastern extremity of Ostrvo Mali Brioni; two areas off the eastern coast of Ostrvo Mali Brioni; foul ground also extends about $\frac{1}{2}$ mile of Rt Mrtulin.

Directions.—When entering Fažana Kanal from southward, the best channel is between Ostrvo Veliki Brioni and Otočić Sveti Jerolim; it is deep and clear of dangers. A vessel should steer northeastward through it and bring the center of Otocic Sveti Jerolim astern, bearing 187° , and continue on this bearing which leads between Plicina Kozada and the reef off Rt Rankon. When abreast Rt Saluga course may be altered northwestward or continued as before if bound for Fažana.

At night a vessel should round the western end of Otočić Sveti Jerolim, and steer to pass about midway between Pličina Kozada Lighthouse and the light buoy off Rt Rankon, thence northward until abreast of Rt Saluga Light, when proceed as directed by day.

LANDMARKS—COASTAL FEATURES (Continued)

6B-24 The coast between Rt Barbariga, the northeastern entrance point of Fažanski Kanal, and Rt Montauro (Punta Auro), $6\frac{3}{4}$ miles northwestward, is indented with numerous coves and is bordered by islets, rocks, and sunken dangers, none of which extends farther than 1 mile offshore, except Pličina Porer (Secca Porer) with a depth of $4\frac{1}{2}$ fathoms situated $2\frac{1}{2}$ miles westward of Rt Barbariga. A number of these dangers are marked by beacons.

Submarine exercise area.—An area extending about 3 miles northward of Greben Kabula, bounded on the western side by the meridian of Greben Kabula Light and extending eastward to the coast is used for submarine exercises. A good lookout should be kept for submarines when passing through these waters.

Another artillery and submarine exercise area covers the same area as the above exercise area and the area eastward of a line extending about $3\frac{1}{4}$ miles northwestward of Greben Kabula, thence eastward about 2 miles to the above area.

Rt Montauro (Punta Auro), is the northern extremity of a rounded promontory, 112 feet high, which has a sea face about $\frac{1}{2}$ mile long. A chain of islets extends $1\frac{1}{2}$ miles south-southwestward from Rt Korente, the southern extremity of the promontory, and terminates at Hrid Sveti Ivan (Scoglio San Giovanni in Pelago), a rocky islet 30 feet high. A light is shown on the summit of the islet. A fog signal is sounded at the light.

LUKA ROVINJ (ROVIGNO D'ISTRIA)

Position: 45°05' N., 13°38' E.

Depths:

Uvala Valdibora, 6 to 14 fathoms.

Uvala Sabionera, 12 to 26 feet.

Quays, 6 $\frac{1}{2}$ - 16 feet.

Port plan: Section 6B-33.

6B-25 Luka Rovinj lies in a bight in the coastline between Rt Auro and Rt Mucja (Punta Mouccia), $1\frac{1}{2}$ miles northward. The bight is divided into two bays by a small peninsula jutting westward and terminating at Rt Sveta Eufemija (Punta Santa Eufemia). Uvala Valdibora, the larger bay, lies northward of the peninsula. The bay southward of the peninsula contains two coves, Uvala Sabionera at its northern end, and Uvala Lone at its southern end close eastward of Rt Montauro.

The town of Rovinj stands partly on the peninsula and partly on the slopes of the surrounding hills.

Off-lying islands.—Ostrvo Sveta Katarina (Isolotto Santa Caterina), situated close

southward of Rt Sveta Eufemija and forming the western side of Uvala Sabionera, has two hills, the western of which is 75 feet high. A conspicuous red building stands at the center of the islet.

Two small islets lie about 1 mile westward of Rt Mucja.

Otočić Banjole (Isolotto Bagnole), 49 feet high and steep-to, lies $\frac{3}{4}$ mile west-northwestward of Rt Montauro.

6B-26 Navigation.—Luka Rovinj can be approached clear of dangers from the coastal track, distant 3.6 miles westward, with Rt Sveta Eufemija, bearing between 067° and 125°.

6B-27 Depths.—Uvala Valdibora has depths of 6 to 14 fathoms except for a rocky isolated patch with a depth of 4 fathoms and another with 5 fathoms located 450 yards southwestward and 575 yards southwestward, respectively, of Rt Mucja.

In the bay southward of Ostrvo Sveta Katarina there are depths of 6 to 13 fathoms. There are two isolated shoal patches off the entrance to this bay; one with a depth of $3\frac{1}{2}$ fathoms located 300 yards west-southwestward of the western extremity of Ostrvo Sveta Katarina, and another with a depth of $4\frac{1}{4}$ fathoms, 490 yards westward of Rt Montauro.

The depths at the berths at the southern part of Uvala Valdibora are 12 to 18 feet, and there are depths of about 11 to 16 feet in the small harbor southward of the town.

6B-28 Landmarks.—Conspicuous in the approach to Luka Rovinj are: Turnina Vrh (Monte delle Torre), 351 feet high and surmounted by ruins, situated 2 miles east-northeastward of the town; Sveti Martin Vrh (Monte San Martino di Leme), 755 feet high, located 5 miles northeastward of the town, a pointed campanile near Rt Sveta Eufemija; the ancient quarries on Rt Montauro; and the lighthouse on Hrid Sveti Ivan.

6B-29 Anchorages.—Recommended anchorages for ocean-going vessels are: in Uvala Valdibora in 11 to 13 fathoms northward of the campanile of Sveta Eufemija and about 320 yards offshore; in 14 fathoms 525 yards northward of Ostrvo Sveta Kat-

arina; in 17 fathoms 650 yards southwestward of Otocic Banjole; and in 17 fathoms about 3 1/2 miles westward of Ostrovo Sveta Katarina.

6B-30 HARBOR.—On the northern side of the town in the southern part of Uvala Val-dibora there is a quay which will accommodate large vessels not exceeding 16 feet in draft. There are two **MOORING BUOYS** off this quay to which berthed vessels may haul when wind and sea makes up from northwestward. Northeastward of this quay there is a pier.

On the southern side of the town there is a breakwater-protected harbor divided into two basins by a central mole. The breakwater can berth vessels with drafts of 18 feet along the outer side, and 10 feet along the inner side.

6B-31 LIGHTS.—Et Sveta Eufemija is marked by a light shown from a square whitish stone tower, 25 feet high, with a gallery.

The southwestern corner of the quay on the northern side of the town is marked by a light shown from a post, 20 feet high.

The head of the breakwater and that of the mole on the southern side of the town are each marked by a light shown from a post.

A buoy, painted red over white, marks the eastern edge of the 3-fathom curve extending eastward from Ostrvo Sveta Katarina.

6B-32 PILOTAGE is compulsory. Pilots board vessels near Ostrvo Sveta Katarina and are available day and night.

6B-33 FACILITIES.—Rovinj, population about 12,000, is the agricultural and fishing center of Istria. Besides exportation of bauxite, the industries include fishing, canning, and tobacco processing.

The quay on the northern side of the town is about 1,270 feet long with about 16 feet alongside. There are water connections at this berth. The pier northeastward of this quay is about 100 feet long and has a depth of 12 feet at its head.

The central mole, in the harbor southward of the town, has depths of 6 1/2 to 13 feet alongside.

Fresh provisions and water are procurable.

There is a small yard for building wooden boats and it is equipped with several marine railways of 400-ton capacity.

There are railway and coastwise steamer connections. Telegraph and telephone services are also available.

Two hospitals serve the town.

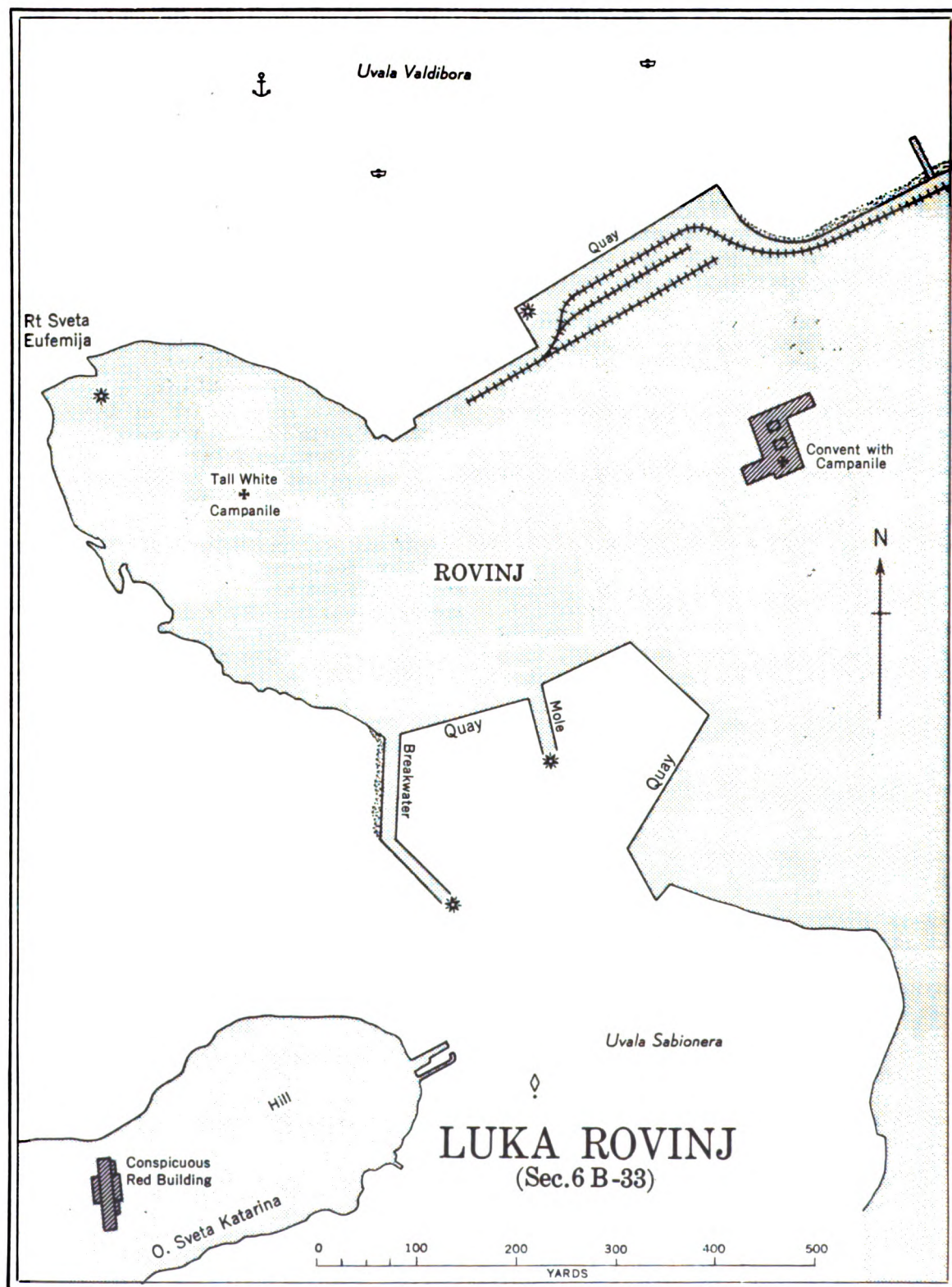
LANDMARKS—COASTAL FEATURES (Continued)

6B-34 LIMSKI KANAL (Canale di Leme) (45°08'N., 13°37'E.) is entered between Et Kriz (Punta Croce), a little more than 2 miles north-northwestward of Rovinj, and Et Siolo (Punta Tiolle), 3/4 mile northward. The Channel which is about 1/2 mile wide at its mouth extends eastward for 5 miles, gradually diminishing in width. From its head, close northward of Sveti Martin Vrh (Monte San Martino di Leme), Limska Draga, a valley, continues eastward. The southern side of the entrance for a distance of 1 mile northeastward of Et Kriz is indented by three coves, beyond which the channel proper begins. The sides of the channel are steep and the tops, which vary from 200 to 500 feet high, are covered with trees and thick bush. The depths diminish gradually toward the head from 18 fathoms at the mouth.

The channel is exposed to wind and sea from westward. The bora is strong here, sometimes blowing out of the channel from the eastward.

DANGERS.—Plicina Fojaga (Secca Fojaga), with a depth of 6 feet over it, rock, lies on the outer end of a shoal extending 800 yards southeastward of Et Siolo and is marked by a red **BEACON** with a wide white stripe in the middle.

Plicina Lim (Secca Leme) extends for about 1/2 mile in an east-west direction. Its eastern extremity, over which there is a depth of 10 feet, lies about 1 mile west-southwestward of the eastern point of Et Siolo and is marked by a buoy.



Otocic Konverzada (Isolotto Conversada) lies close westward of Rt Siolo to which it is connected by a shoal spit.

Plicina Konversari (Secca Coversada) is a small isolated shoal with a depth of 9 feet lying about 1/4 mile west-southwestward of Otocic Konverzada. It is marked by a buoy.

The best ANCHORAGE in Limski Kanal for a large vessel is in about 18 fathoms southeastward of Kuca Crijenka (Casa Cerlenca), a conspicuous building standing on the northern shore of the channel about 1 mile eastward of Rt Siolo.

The COAST between Limski Kanal and Luka Porec (Porto di Parenzo), about 6 miles northward, is lower than that southward and is indented with numerous inlets, but with the exception of Luka Vrsar (Porto di Orsera) and Luka Funtana (Porto Fontane) they can accommodate small vessels only. This coast is bordered by islets, rocks, and dangers which extend at one place to a distance of 1 1/2 miles offshore. Vessels should avoid closing this part of the coast and should not permit the lighthouse or Rt Zub (Punta del Dente) (sec. 6B-38), to bear less than 013°.

6B-35 LUKA VRSAR (Porto di Orsera) (45°09'N., 13°36'E.) consists of a small inlet protected to northeastward by a point of land and to southwestward by Otocic Sveti Juraž (Isolotto San Giorgio), in a position 1 1/2 miles north-northwestward of the entrance to Limski Kanal. The hills surrounding the inlet are tree covered and from 70 to 150 feet high. The town lies eastward of the head of the inlet and is fronted by quays having shallow depths alongside. There is a pier about 150 feet long with an alongside depth of 13 to 16 feet. A LIGHT is shown from the head of the pier.

Otocic Galiner (Isolotto Galiner), a scrub covered islet, lies close off the center of the entrance to the inlet. A LIGHT is shown on the summit of the islet.

Hrid Orlandin (Scoglio Orlandin), a bare, gray colored rock, lies about 700 yards north-westward of the preceding islet.

Uvala Plove (Valle Plove) lies between the northwestern entrance point of the inlet and several islets northeastward.

ANCHORAGE for small vessels can be taken northeastward of Otocic Sveti Juraž.

DANGERS OFF-LYING LUKA VRSAR.—

These dangers may be divided into three groups as represented by the obscured sectors of Otocic Galiner Light. The southwestern group consists of Otocic Lunga (Isolotto la Longa), Plicina Galopon (Scoglio Galopon), and Plicina Saso (Secca Saso). This group lies between the bearings of 025° and 049° of Otocic Galiner Lighthouse, and within a distance therefrom of 1 mile. Plicina Saso, which breaks, is the westernmost of this group and is marked by a stone BEACON.

The western group, from south to north, consists of Plicina Marmi (Secca Marmi) with 6 feet of water, Plicina Marmi Srednja (Secca Marmi di Mezzo) with a depth of 12 feet, and Plicina Marmi Veliki (Secca Marmi Grande) with a depth of 11 feet. Plicina Marmi is marked by a light. The northern shallowest part of Plicina Marmi is marked by a buoy. The western group lies between the bearings of 064° and 099° of the reference lighthouse and within a distance therefrom of about 1 1/2 miles.

The northern group consists of a number of islets including Hrid Orlandin and lies between the bearing of 116° of the reference lighthouse and the shore.

DIRECTIONS FOR ENTERING LUKA VRSAR.—Vessels may safely approach Luka

Vrsar between the offshore dangers by heading for Otocic Galiner Lighthouse within the white sectors of the light; that is between the bearings of 049° and 064°, and between 090° and 116° of the lighthouse. Vessels approaching from southwestward during daylight may pass safely between Plicina Saso and Plicina Marmi by steering for Hrid Orlandin in range with the campanile of Funtana, about 1 1/4 miles northeastward, on a bearing of 037°.

6B-36 LUKA FUNTANA (Porto Fontane) (45°11'N., 13°36'E.), about 1/2 mile in diameter, is a bay situated nearly 2 miles northward of Luka Vrsar and contains secure anchorage for small vessels. It is entered between Rt Greta (Punta Fontane) and a closely off-lying islet, Otocic Veliki Skolj (Isolotto Revera Grande) to southward and Rt Jurina (Punta Bassolini) to northward. Reefs extend for a distance of 0.7 mile westward from the southern entrance point. A dangerous rock, marked by a BEACON, lies 175 yards northward of the latter point. Plicina Benvinjuda (Secca Benvegnuta), a reef-surrounded rock which breaks and is marked by a beacon, lies 775 yards westward of the northern entrance point.

The shore of the bay is bordered by reefs, and an isolated reef with a depth of 13 feet lies in the center of the bay. The church campanile in the village of Funtana, southeastward of the bay, and the chapel of a cemetery on the southeastern shore are prominent. Two short piers for small craft are located near the village.

ANCHORAGE.—Anchorage, in depths of 7 to 9 fathoms good holding, may be had northward of the two short piers.

The COAST between Luka Funtana and Luka Porec (Porto di Parenzo), 3 miles northward, continues profusely indented with small coves and is fronted with numerous islets, rocks and dangers which extend 1 1/2 miles offshore in places.

Otocic Altijez (Isolotto Altese), a low bare islet lying 1/2 mile westward of Debeli Rt (Punta Grossa), which is situated 1 mile northwestward of Luka Funtana, is marked by a light. Plicina Bekerija, with 5 feet over it and marked by a beacon, lies about 1 1/4 miles north-northeastward of Otocic Altijez.

6B-37 LUKA POREC (Porto di Parenzo) (45°14'N., 13°35'E.), located 2 miles northward of Debeli Rt, lies between a small peninsula jutting west-northwestward from the shoreline and a reef southwestward on which stands Otocic Sveti Nikola (Isolotto San Nicolo), flanked southeastward by Hrid Sarafel (Scoglio Sarafel), and northwestward by Hrid Kalbula (Scoglio Calbula). Hrid Barbaran (Scoglio Barbaran), a low lying flat rock, lies on a reef directly northward of the entrance. A breakwater extends 200 yards north-northeastward from the northern extremity of Otocic Sveti Nikola, and another breakwater joins the southeastern extremity of the islet with Hrid Sarafel. The latter breakwater has a small craft opening at about mid-length.

The town of Porec stands on the peninsula and extends for a distance eastward. The northeastern side of the harbor southward of the town is quayed for a distance of about 1,700 feet, from about the center of which extends a 190-foot pier. Obala 9 Septembar, fronting the hotel, has an alongside depth of 5.2m (17 ft.), the pier 3m (10 ft.) to 3.9m (13 ft.), and elsewhere the depths alongside are less than 3m (10 ft.).

LANDMARKS.—Otocic Sveti Nikola, with a conspicuous castle and the ruins of a tower, are good landmarks. The church tower and cathedral, in the town, are conspicuous.

ANCHORAGE.—An anchorage berth 300 yards in diameter in 5.5m (18 ft.) to 6.1m (20 ft.) of water over mud is available in the center of the harbor. Large vessels anchor as convenient in about 22m (12 fm) over good holding mud westward to northwestward of Hrid Barbaran.

LIGHTS.—Hrid Barbaran Light is shown on the summit of the rock.

The head of the northeastern breakwater is marked by a light.

A **LIGHT** is shown from the southeastern corner of Obala 9 Septembar.

A **LIGHT** is shown from the head of the pier.

DIRECTIONS FOR ENTERING LUKA POREC.—To avoid the reefs lying northward and southward of Luka Porec, vessels must approach Hrid Barbaran between the bearings of 062° and 153°, and when about 1/2 mile therefrom may head for the position desired, taking care to avoid the fringing reefs of Hrid Barbaran and Hrid Kalbula. To enter the port, pass between Hrid Barbaran and the head of the breakwater extending from Otocic Sveti Nikola.

6B-38 The **COAST** between Luka Porec and Rt Zub (Punta del Dente), 4 1/2 miles

northward, is irregular with bordering reefs, the most extensive one being PLICINA CIVRAN (Secca Civran) which extends about 1 mile westward from a point 1 1/2 miles south-southeastward of Rt Zub. The south-westernmost limit of Plicina Civran is marked by a cylindrical BUOY painted black above and white below. Plicina Ambolizo lies about 1 mile north-northwestward of Hrid Barbaran.

All dangers off this stretch of coast will be avoided by keeping Hrid Barbaran Lighthouse bearing not more than 153°, and Rt Zub Lighthouse bearing not less than 018°.

RT ZUB (Punta del Dente), the sloping extremity of a peninsula about 1 mile long, is situated at the southern entrance point of Porto Quieto. A light is located on the point. A fog signal is sounded on a siren at the lighthouse.

6B-39 PORTO QUIETO (45° 18' N., 13° 34' E.), a bay about 1 mile wide and long, is entered between Rt Zub and Punta Vescovo, 1 1/4 miles north-northwestward, the extremity of a short peninsula on which stands the town of Cittanova. Fiume Quieto discharges through a prominent valley into the northeastern head of the bay. The southern shore of the bay consists of hills and cliffs whereas the northern shore slopes gently except at its eastern end where there are steep reddish cliffs. The depths decrease gradually toward the head from about 20.1m (11 fm) at the entrance.

SECCA DI VAL, an irregularly shaped reef with a depth of less than 3m (10 ft.), lies about 1/2 mile southwestward of Punta Vescovo, and is marked by a Buoy which is liable to break adrift. Secca Di Quieto with a depth of 8.5m (28 ft.) lies about 1/2 mile eastward of Secca di Val. A bearing of 072° on the chimney, about 1 1/4 miles eastward

of Porto di Cittanova, tangent to Punta San Pietro, about 1/2 mile west-southwestward of the chimney, will lead clear southward of the reefs at the entrance of Porto Quieto.

The best anchorage is about 3/4 mile northeastward of Rt Zub, in 16.5m (9 fm).

The best LANDMARKS in the area are: the town of Cittanova with the dark valley of the river Mirna in the background, the steep Rt Zub with its light, the chimney of the brick-works, and several bell towers on the southern side of the bay.

PORTO DI CITTANOVA (Novigrad), situated immediately northward of the northern entrance point of Porto Quieto, consists of a small bay entered between Punta Vescovo and Punta Carpignano, about 600 yards north-northwestward. Shoals encumber the bay restricting its use by large steamers. The partially walled town of Cittanova lies on the peninsula southward of the bay. A conspicuous white belfry is located in the town. The population is about 2,000; there are telegraph and telephone facilities and a small shipyard for wooden vessels. A breakwater extends northwestward from Punta Vescovo and to eastward there is a quayed mole. A small craft basin lies farther eastward. The maximum draft that can berth alongside is 10 feet. The heads of the breakwater, the principal mole, and the mole of the small craft basin are each marked by a LIGHT. A shoal near Punta Vescovo is marked by a pole. An anchorage berth about 300 yards in diameter in about 10.9m (6 fm) of water lies midway between Secca di Val and Punta Carpignano. Provisions and water are available in limited quantities.

Between Cittanova and Umago, a town about 7 miles northward, the COAST is clear of offlying dangers with the exception of 2 wrecks. One wreck with 7.3m (4 fm) of water over it, lies 7 miles westward of Cittanova peninsula; the other, with 10.9m (6 fm) of water over it, lies 3 miles westward of the same peninsula. The shoreline is low and indented by several bays. Porto Daila being the only one of importance.

PORTO DAILA, 2 1/2 miles northward of Cittanova, is a small bay entered between Punta Daila to southward and Punta Comune to northward. A reef extends about 750 yards northwestward from Punta Daila, the outer extremity of which is marked by a BUOY.

A conspicuous convent stands close eastward of the southern entrance point. There is an anchorage berth about 600 yards in diameter in 6.1m (20 ft.) to 8.5m (28 ft.) of water over good holding ground northward of the convent. A light marks the head of a small lumber and bauxite loading pier at the northeastern side of the bay. A depth of about 3.9m (13 ft.) exists at the head of the pier.

6B-40 PORTO DI UMAGO (Luka Umag) (45° 26' N., 13° 31' E.), situated 7 miles northward of Cittanova, is a circular bay, about 1/2 mile in diameter, formed to northward by Punta Pegolotta and to southward by a small point of land on which stands the town of Umago. A curved breakwater, 380 yards long, extends northwestward from the town. The entrance lies between the head of the breakwater and the beacon on Secca dei Greci (see below), and is marked by two light buoys. Vessels with drafts up to 11 feet may anchor in the harbor, and up to 8 feet can berth alongside.

DANGERS AND AIDS TO NAVIGATION.—Secca Peglotta is a dangerous reef with depths of less than 0.9m (3 ft.) extending about 450 yards westward from Punta Pegolotta. Its western extremity is marked by a light beacon. Depths of less than 4.9m (16 ft.) extend about 180 yards farther westward from the light beacon.

Secca dei Greci is another dangerous reef with depths of less than 0.9m (3 ft.) extending about 375 yards southward from Punta Pegolotta and is marked on its southern extremity by a beacon.

Lights are shown on the head of the breakwater and the head of the pier.

Anchorage.—The best berth is in 18.3m (10 fm) over good holding mud with the town's campanile bearing 090° and Secca Pegolotta Light Beacon bearing 348°. Another good anchorage is in 26m (14 fm) about 2 miles westward of Umago with the light beacon bearing 063°.

Pilotage is compulsory and pilots are available day and night. The pilot is embarked and disembarked about 1 mile westward of Punta Pegolotta.

Posoj is a port, under construction (1964), close southward of Porto di Umago. Instructions for entering the port should be obtained from the Port Authorities at Porto di Umago.

The COAST between Umago and Capo Salvore, about 4 miles northward, is low and indented with several small bays. Numerous reefs and rocks lie offshore, all of which may be cleared safely by keeping Secca Pegiolotta Light Beacon bearing 163° or less.

SCOGLIERA SCIPAR, some rocks of which uncover, extends 3/4 mile southwestward from a position 1 mile south-southeastward of Punta Lanterna, see below. A BUOY marks their southwestern extremity. This buoy is often swept away by the sea.

Secca Scar with a least depth of 7.3m (4 fm) lies nearly 1 mile southwestward of Punta Lanterna.

6B-41 CAPO SALVORE (45° 30' N., 13° 30' E.), the northwestern extremity of Istria and the eastern entrance point of the Gulf of Trieste, has a sea face of 1 1/2 miles containing three distinct projections. Punta Lanterna is the southwestern point, Punta di Mezzo the middle, and Punta Salvore (Et Savudrija) the northeastern. The cape is low and of dark appearance. A refuge harbor protected by a mole for small craft is situated at Salvore, close southwestward of Punta Salvore. A LIGHT is shown on the head of the mole.

A white conical pillar is located on the reef southwestward of the entrance; vessels leave the pillar to starboard as they enter.

Capo Salvore Light is shown on Punta Lanterna; there is also a signal station and telegraph at the light. A FOG SIGNAL is sounded from the light.

Several isolated Reefs with depths of 6.5m (3 1/2 fm) to 10.4m (5 3/4 fm) lie northwestward of Capo Salvore, none of which is beyond 1 1/2 miles offshore. Deep draft vessels should not close the cape nearer than 2 miles.

When the strongest bora is blowing in the Gulf of Trieste, vessels have experienced sometimes almost a calm while lying under the cape.

WRECKS.—Several dangerous wrecks lie in the approach to the Gulf of Trieste. One wreck lies about 6 miles south-southeastward of Punta del Tagliamento (sec. 6A-1) and has about 13.4m (44 ft.) of water over it. Three wrecks lie about 5 3/4 miles northward, 4 1/2 miles north-northwestward, and 5 miles northwestward, respectively, of Punta Salvore. A dangerous wreck lies on the northern side of Punta Salvore.

miles north-northwestward, and 5 miles northwestward, respectively, of Punta Salvore. A dangerous WRECK lies on the northern side of Punta Salvore.

6B-42 BAIÀ DI PIRANO is entered between Punta Salvore and Punta Madonna, 3 miles northeastward and on which stands a cylindrical tower. The bay is about 3 miles long and contains two coves at its head. Both of these coves are shallow and the holding ground is poor for anchorage. The northeastern shore is backed by hills cultivated with olive and cypress whereas the southwestern shore is low and has sparse growth. The depths in the bay decrease uniformly from 18.3m (10 fm) at the entrance. A light is shown on Punta Maddona. A FOG SIGNAL is sounded at the light.

PORTO DI PIRANO, close southward of Punta Madonna, consists of an outer and inner harbor for small craft. The outer and larger harbor is protected by two moles and has depths of 1.5m (5 ft.) to 5.5m (18 ft.). The head of each mole is marked by a light. Conspicuous from seaward are the ruins of an old medieval castle, on the heights eastward of the town, and a high steeple of a church, which stands near the edge of a high wall. The town has a population of about 4,200 and exports fruits, vegetables, salt, soap, and coal. An unlimited supply of boiler and drinking water is available from hydrants; fuel oil and lubricants are limited. There are telegraph and telephone facilities. Regular steamship service is available to Trieste and Pula.

PUNTA SAN BERNANDINO, 1 mile southward of Punta Madonna, is marked by a LIGHT. The village of PORTOROSE, close eastward of Punta San Bernardino, is fronted by a quay. At the western side of the quay there is a short pier with 2.1m (7 ft.) at its head which is marked by a light. A wooden pier with a T-head is near the above pier and has depths of 4.9m (16 ft.) at the head. There is very little maneuvering room.

The best anchorage for a large vessel is in about 14.6m (8 fm) over good holding mud and clay about 600 yards offshore between Pirano and Punta San Bernardino. There is also another anchorage about 1/2 mile off

the southwestern shore but the bottom has only fair holding quality. Anchoring is PROHIBITED eastward of a line drawn from Punta San Bernardino bearing 204° to the southern shore.

The COAST between Punta Madonna and Punta Prete, 1 3/4 miles eastward, forms a bight at the eastern head of which is a pier near salt beds. Punta Ronco, 1/2 mile east-northeastward of Punta Prete, is a dark cliffy point rising from the sea to Monte Ronco, close inland and 380 feet high. A framework BEACON painted in black and white horizontal bands stands on the point.

6B-43 BAIJA DI CAPODISTRIA (45° 34' N., 13° 42' E.) is entered between Punta Ronco and Punta Grossa, 5 miles northeastward. The northeastern and southwestern shores of the bay are hilly but the shore of the head of the bay through which flows Torrente Risano is low. Monte Sermino, 279 feet high and surrounded by salt beds, rises isolated in the river valley. The depths in the bay decrease uniformly from 18.3m (10fm) at the entrance. The head of the bay fronting the river delta is shallow.

Along the northern and eastern shores of the gulf, vessels may encounter FISHING NETS. Care should be taken to avoid the pilings supporting the nets as they are not always visible above the sea surface.

Pilotage is compulsory and pilots are available day and night. The pilot is embarked and disembarked in the sea area about 1 1/2 miles from the breakwater light.

ISOLA D'ISTRIA (Izola), a town of about 7,000 population situated 2 miles eastward of Punta Ronco, completely occupies a small peninsula. Punta Gallo forms the northwestern extremity of the peninsula and is marked by a light. A small craft harbor protected by two moles lies on the western side of the town. A maximum draft of 10 feet may be accommodated in the harbor. A light marks the head of each mole. Fishing nets extend about 3 miles offshore; they are usually marked so that they may easily be seen.

CAPODISTRIA (Kopar), 3 miles eastward of Isola d'Istria, stands on gently sloping

rocky terrain which appears as an island. The town, about 8,000 population, has Venetian aspect. Two moles form a small harbor on the western side of the town for craft not exceeding a draft of 10 feet. The head of each mole is marked by a light. Vessels leaving and entering the small harbor should steer clear of the head of the northern breakwater because of a shoal. Pilotage is compulsory. Pilots are available during daylight only. A light buoy is moored about 1/2 mile northeastward of the head of the northern breakwater. The main quay is on the northern shore of Capodistria, and provides 1800 feet of wharfage with 10m (33 ft.) alongside. It was reported (1967) that an additional 400 feet of wharfage with 12.2m (40 ft.) alongside will be constructed. The entrance to the berths is by way of a turning basin westward of the wharf, thence eastward between a line of buoys and the wharf. The line of buoys were reported (1967) non-existent; one red buoy was reported 300 feet off the wharf. The channel heading to the wharf is reported dredged to 9.1m (30 ft.). The width of the channel allows only one vessel to pass. Vessels leave by backing to the turning basin. Two tugs are available. Cargo operations are carried out with ship's gear, except for automatic handling of grain. Fuel oil is available by barge. Fresh water is obtainable at the berths. A mole for off-loading tankers was reported under construction (1968) north-eastward of the main wharf.

LANDMARKS.—Conspicuous in the bay are: a convent on the northeastern shore near the beach; a sanitarium southeastward; the town of Antignano to eastward on the northern side of the river valley on an elevation, 1,217 feet high; prominent yellow cliffs between Isola d'Istria and Capodistria over which rises Monte San Marco, 735 feet high and surmounted by ruins; and the campaniles of the two towns.

ANCHORAGE in Baia di Capodistria can be taken most anywhere though the holding ground is not good. The recommended berth is in about 18.3m (10 fm) 1/2 mile offshore southward and south-southeastward of Punta Grossa.

A light is shown on the head of the mole near Antignano.

A light is shown on the head of a mole about $1\frac{1}{4}$ miles northwestward of Antignano.

6B-44 Punta Grossa (Debeli Rtic) and Punta Sottile ($45^{\circ}36'N.$, $13^{\circ}53'E.$).—A promontory, about 2 miles wide, which extends northwestward separating Baia di Capodistria and Baia di Muggia, terminates in two points, Punta Grossa to southwestward and Punta Sottile, $1\frac{1}{4}$ miles northeastward. A light is shown close westward of Punta Grossa at the extremity of the shoal fronting the point.

A buoy marking the extremity of the shoal fronting Punta Sottile is moored close westward of that point. A white obelisk stands on Punta Sottile near the lighthouse ruins. From the northern side of the point a wooden pier extends about 220 feet with a depth of 2.4m (8 ft.) at its head.

Measured distance.—Two range beacons are installed on Punta Sottile to mark a measured distance on a base course of 042° — 222° . Vessels with a speed in excess of 20 knots using the range beacons must proceed at a distance of at least 2 miles northwestward of a bearing of 042° on Molo Fratelli Bandiera Lighthouse at Porto di Trieste.

Valle San Bartolomeo, a bay lying between Punta Grossa and Punta Sottile, is a quarantine anchorage for Porto di Trieste. A commercial quay off which are anchored some mooring buoys fronts the buildings of the Lazaretto situated close southward of Punta Sottile. A light is shown from the northwestern corner of the quay. Vessels approaching the bay should remain between the bearings of 065° and 130° of this light to avoid the shoals bordering the entrance points. Another light is shown close southward of the quay. Large vessels may anchor in 14.6m (8 fm) over good holding mud westward of the Lazaretto.

6B-45 Baia di Muggia.—The part of this bay lying northward of Punta Servola, situated on the eastern shore about 1 mile northward of the southern shoreline, may be considered integral with Porto di Trieste and is described thereunder.

The southern part of Baia di Muggia is entered between Punta Ronco, $\frac{3}{4}$ mile east-

northeastward of Punta Sottile, and the southern extremity of Diga Luigi Rizzo (sec. 6B-55), an entrance 800 yards wide. A lighted bell buoy is moored about one mile west-northwestward of Punta Ronco, on the axis of the entrance channel, and marks the southwest limit of the tanker waiting anchorage. A fog signal is sounded at the light on the southern extremity of Diga Luigi Rizzo, and marks the southeast limit of the tanker waiting anchorage. Light buoys mark the channel to the marine terminal at San Sabba. The entrance channel was dredged (1967) to a depth of 16.4m (54 ft.). The southern part of the bay extends about 3 miles eastward from the entrance and terminates in Valle di Zaule (Vallone di Muggia), the head of which is shallow and bordered by salt flats. The bay is backed by hills mostly cultivated on which are numerous villages, farms and villas. The land is low and level at the head of the bay. With the exception of a narrow bordering shoal and the shallow head of Valle di Zaule, there are depths of 10.9m (6 fm) to 18.3m (10 fm). Two railroad cars, one loaded with stone, lies about 270 yards northeastward of Punta Ronco in about 12m (6 $\frac{1}{2}$ fm).

San Rocco Shipyard, a branch of the Cantieri Riuniti dell'Adriatico (CRDA), lies 0.8 mile eastward of Punta Ronco.

Facilities.—In a small artificial harbor there are a slipway and a drydock, the latter having the following dimensions: length on bottom, 394 feet; breadth, 66 feet, and will accommodate vessels up to 53 feet beam; depth over sill, 6.4m (21 ft.), but water sometimes rises 1.5 feet above this depth.

The small harbor of the village of Muggia, protected by two moles, is situated $\frac{1}{2}$ mile eastward of the shipyard. Vessels, 490 feet in length with drafts up to 19 $\frac{1}{2}$ feet, can berth alongside. A light marks the head of each mole. Vessels must not exceed a speed of 6 knots in the harbor.

Aquila Oil Refinery, the larger of two in Baia di Muggia, is located at the head of Canale di Zaule, the site of the new industrial port. A tanker pier connected by pipe lines to the refinery extends 1,312 feet west-northwestward from the southern shore of Valle di Zaule at a position $1\frac{1}{4}$ miles eastward of Muggia. Two lights are shown on

the pier, one on the head and the other about 80 yards east-northeastward off the head. The maximum draft that can safely be taken alongside is 32 feet. Two chimneys stand about 700 yards east-southeastward and 1,700 yards east-northeastward, respectively, of the head of the tanker pier.

Zaule Industrial Port (Porto Industriale).—The industrial port lies at the head of Valle di Zaule, and is an inlet about 1/2 mile long and 200 yards wide. This port is the point of discharge for bulk cargoes intended for local industries. In 1966 the channel was dredged to 11.9m (39 ft.). A small pier is close to its southern entrance point; a light is shown on the west corner of the head of the pier. Another small pier projects from the northern shore, about 1/2 mile east-northeastward of the small pier near the southern entrance point. A pier, 656 feet long, is on the northern side. A mobile crane is available. Water can be supplied. Tugs are available. Pilotage is reported to be carried out only by day. A small pier is on the northern end of the inlet. Two lights, vertically disposed, are shown on the southern side of the entrance. Lights in range 064° lead into the inlet. The front light is about 1/2 mile east-northeastward of the entrance.

Porto del Petrolio di San Sabba, situated at the northern entrance point of Valle di Zaule, consists of the petroleum discharging facilities of the Societa Italo-Americana del Petrolio (SIAP). A breakwater, 984 feet long, extends southwestward from San Sabba at the western extremity of the refinery. A marine terminal for the transalpine pipeline, Trieste-Ingolstadt, is located close westward of San Sabba and connected to San Sabba West Mole. The terminal consists of Piers 1 and 2, each capable of berthing 2 super-

tankers. The outer ends of piers and the head of San Sabba West Mole are marked by lights. In 1968 it was reported that vessels with a draft of 15.8m (52 ft.) can be accommodated alongside. A church stands about 1250 yards east-northeastward of the head of the breakwater. The inner eastern side of the breakwater is quayed, against which tankers secure by the bow. There is a depth of 9.1m (30 ft.) alongside the quay. Close southeastward a 197-foot T-headed pier provides a berth for tankers at its head. Mooring buoys are located off the head of the pier. Close southeastward of this pier is a 755-foot tanker pier, with depths of 10.4m (34 1/2 ft.) to 11.9m (39 ft.) alongside. Lights are shown from the heads of the breakwater and the southernmost pier.

Servola.—The shore directly southeastward of Punta Servola, 3/4 mile northwestward of the petroleum port at San Sabba, is quayed for 820 feet with depths of 7m (23 ft.) alongside. Reclamation (1966) is in progress within an area fronting Servola, between a point about 1/3 mile south-southeastward of Punta Servola and the small pier lying parallel to the breakwater that projects southwestward from San Sabba.

A light marks the northwest corner of the quay about 1/3 mile south-southeastward of Punta Servola.

Anchorage with protection from all winds especially the bora may be taken anywhere in the bay over good holding mud excepting in Valle di Zaule. The use of two anchors is recommended during a strong bora.

PILOTAGE—Section 6B-56.

ANCHORAGES

6B-46 In case of emergency it is possible to anchor anywhere from 1 to 3 miles off the western coast of Istria. The best anchorage over tenacious mud is found from 1 to 2 miles

westward of Porto di Umago, the poorest off Luka Poreč.

The following are the positions of recommended anchorages:

Medulinski Zaliv (Baia di Medolino).—In a berth, 500 yards in diameter, in 9 fathoms over good holding mud between Otočić Ceja and the islet adjacent northwestward.

Luka Veruda.—Section 6B-9.

Rt Kumpare (sec. 6B-9).—Vessels wishing to ride out a bora before passing eastward of Rt Kamenjak, may anchor anywhere off this coast in depth desired, except for the prohibited anchorage mentioned in sections 6B-14 and 6B-23. The preferred anchorage in this locality is in 20 fathoms over good holding mud or sand about $\frac{2}{3}$ mile westward of the southern extremity of the headland of Rt Kumpare.

Luka Pula.—Section 6B-14.

Fažanski Kanal.—Section 6B-23.

Luka Rovinj.—Section 6B-29.

Limski Kanal.—Section 6B-34.

Luka Vrsar.—Section 6B-35.

Luka Funtana.—Section 6B-36.

Luka Poreč.—Section 6B-37.

Porto Quieto.—Section 6B-39.

Porto Daila.—Section 6B-39.

Valle San Lorenzo.—In 13 fathoms over mud about $2\frac{1}{2}$ miles westward of Valle San Lorenzo, situated $1\frac{1}{2}$ miles northward of Porto Daila.

Porto di Umago.—Section 6B-40.

Baia di Pirano.—Section 6B-42.

Baia di Capodistria.—Section 6B-43.

Valle San Bartolomeo.—Section 6B-44.

Baia di Muggia.—Section 6B-45.

Porto di Trieste.—Section 6B-52.

PORTO DI TRIESTE

Position: 45°38' N., 13°45' E.

Depths:

Entrance, 10 fathoms.

Porto Franco Vecchio, 18 to 38 feet.

Porto Doganale, 24 to 54 feet.

Porto Franco Nuovo, 32 to 65 feet.

Quays, 13 to 30 feet.

Tide: Mean range, 1.7 feet; spring, 2.8 feet.

Port plan: Section 6B-58.

6B-47 Porto di Trieste, situated on the eastern shore of the Gulf of Trieste, is the

largest and most important port in the Adriatic. The port consists of three parts constructed northward and southward of a point of land that extends westward from the foot of the Catena del Corso, surrounding which stands the city of Trieste.

Porto Franco Vecchio (Porto Vittorio Emanuele III) is the older and northernmost harbor and consists of quays and piers protected by a detached breakwater.

Porto Doganale, immediately southward of the preceding harbor, consists of a number of quayed basins and piers unprotected to northwestward.

Porto Franco Nuovo (Porto Emanuele Filiberto Duca d'Aosta), protected by three detached breakwaters, is the southernmost and newest harbor lying at the northern part of Baia di Muggia. It contains several large piers, quays, and shipbuilding yards.

NAVIGATION

6B-48 The following courses from the positions indicated will lead to a position 1 mile westward of the head of Molo Fratelli Bandiera:

From a position on the coastal track with Punta Lanterna Lighthouse (Capo Salvore) bearing 139°, distant 2.3 miles, course 056° for 14 miles.

From the entrance buoy at Porto di Monfalcone, 134° for 10 miles.

From the entrance buoy at Porto Lido-Venezia, 075° for 53 miles.

A fog signal is sounded on a nautophone from the light structure on the northern extremity of the northern detached breakwater of Porto Franco Nuovo.

CURRENT, WIND, AND TIDE

6B-49 The current at the entrance to the port is generally negligible, never exceeding a velocity of 1 knot.

Wind.—During winter and late autumn the bora blows in the Gulf of Trieste with the greatest strength near Trieste. At the height of a violent bora vessels are advised to anchor in Baia di Muggia rather than attempt entering Porto di Trieste.

Tide.—The high water interval is 9 h. 32 m. The mean tidal range is 1.7 feet; the maximum is 2.8 feet.

DEPTHS—DANGERS

6B-50 The depth in the approach to Porto di Trieste and in the usual anchorage off the port is about 10 fathoms. The depths alongside the berths for ocean-going vessels are from 13 to 33 feet with superior depths in the approaches to the berths.

See sections 6A-1 and 6B-41 for wrecks which lie in the vicinity of the course line. A wreck, with 52 feet of water over it, lies about 1 mile westward of the head of Molo Fratelli Bandiera.

LANDMARKS

6B-51 Haze frequently obscures the landmarks in the approach to Porto di Trieste until fairly close-to but in clear weather the mountains backing the shoreline are prominent, the highest summit being Monte Nanos, 4,265 feet high, located about 14 miles northeastward of the city. Conspicuous on closer approach are: Vittoria Lighthouse (sec. 6A-20), situated 0.7 miles northward of the northern entrance to Porto Franco Vecchio; two prominent groups of four radio masts about 700 yards eastward of the lighthouse; an obelisk standing on an elevation lower than and close to Monte Poggioreale (Opcina) about 1 mile eastward of Vittoria Lighthouse; a television tower 1,840 feet high, from which lights are shown, stands about 1 mile east-southeastward of Monte Poggioreale; Castello di Miramare (sec. 6A-19) on a point of land 2 1/2 miles northwestward of the lighthouse; the fortress on Monte San Giusto which overlooks the city; the three detached breakwaters of Porto Franco Nuovo; and the lighthouse on Molo Fratelli Bandiera.

ANCHORAGE

6B-52 Unlimited, partly protected anchorage berths of all classes are available in the roadstead westward of the port in 10 fathoms, mud. Separate anchorage in Baia di Muggia are available for general cargo vessels and tankers. Protection is ample and the holding ground is good.

There is insufficient room for an ocean-going vessel to anchor within the port.

Anchoring is prohibited southward of a line extending in a 250° direction from the northwestern corner of the head of Molo II in Porto Franco Vecchio and westward of the breakwater.

Anchoring is prohibited for any vessel in Porto Doganale southward of the southern extremity of the breakwater of Porto Franco Vecchio.

HARBOR—PORTO FRANCO VECCHIO

6B-53 Porto Franco Vecchio, known previously as Porto Vittorio Emanuele III, is the northernmost harbor and consists of about 4,800 feet of quayed shore frontage from which extend five large piers forming four basins. A long detached breakwater paralleling the quayed shore protects the harbor between Bacino I, the northernmost basin, and Bacino IV, the southernmost. Bacino I is further protected to westward by a quayed mole. A spur projects from the detached breakwater near its northern extremity toward Molo I, the northernmost pier, providing a passage into the harbor about 315 feet wide, though entrance into this harbor is made usually from southward where the entrance is about 518 feet wide.

Lights are shown from each extremity of the breakwater and from the head of the spur.

HARBOR—PORTO DOGANALE

6B-54 Porto Doganale lies between the southern extremity of the detached breakwater of Porto Franco Vecchio and Molo Fratelli Bandiera, about 820 yards southwestward. The southeastern shoreline, about 3,300 feet long, is quayed from which extend six piers. Molo Bersaglieri, the second pier from northeastward and the largest in this harbor, contains the Stazione Marittima and is used for large vessels including passenger vessels. Molo Fratelli Bandiera is a broad quay extending 340 yards northward from the point of land separating the two northern harbors and the southern. It is flanked on either side by a basin, that to westward being protected by an angular breakwater. The angle of the breakwater is marked by a light and a light is shown from its head.

The basin to the eastward is protected by a breakwater extending east-northeastward from the eastern extremity of Molo Fratelli Bandiera. A light is shown from the breakwater head.

From the eastern part of the harbor between Molo IV and Molo Audace, Canale Grande, used by small vessels and crossed by several bridges, extends about 365 yards east-southeastward into the city.

Molo Fratelli Bandiera Light is shown from a tower, situated near the root of the mole. Storm signals are shown from the light structure. A light is shown from the head of Molo Venezia.

HARBOR—PORTO FRANCO NUOVO

6B-55 Porto Franco Nuovo, previously known as Porto Emanuele Filiberto Duca d'Aosta, lies southward of the point of land at the root of Molo Fratelli Bandiera, and may be considered to extend southward to Punta Servola, at about the center of Baia di Muggia. Molo V and Molo VI, two modern piers about 1,253 feet long and 528 feet wide, extend from the quayed shore west-southwestward in the direction normal to the bora. Molo VII, to southeastward, is under construction. Several mooring buoys are found close off Molo VI.

Three detached breakwaters protect the harbor to westward, the southern and longest section is called Diga Luigi Rizzo. The two openings in the breakwater are so aligned that a vessel may enter to the basins between the piers on a heading into the direction of the bora. The harbor may be entered also from northward and southward.

At the head of the cove between the root of Molo VII and Punta Servola are the shipbuilding and ship repair yards of San Marco and Arsenale Triestino. Molo d'Allestimento is a pier extending about 600 feet southwestward from the San Marco Shipyard, and Molo dei Legnami is another pier about 575 feet long on the eastern side of the cove. Navigation is prohibited in this area. In order

to moor at any of the piers, permission must be obtained from the port authorities.

Lights and buoys.—Each extremity of the three detached breakwaters is marked by a light.

Each of the following is marked by a light: the northern and southern corner extremities of Molo V; the corner of the drydock entrance at Arsenale Triestino; and the head of Molo dei Legnami.

PILOTAGE

6B-56 Pilotage is compulsory. It was reported (1962) that pilots board between 0600 and 2000, about $\frac{1}{2}$ mile westward of Molo Fratelli Bandiera. Pilotage at night requires advance notice of ETA. A representative of the Captain of the Port accompanies the harbor pilot to inform masters of berthing orders and to assist in docking and handling tugs.

The pilot station for tankers bound to any of the oil terminals of the port lies about 3 miles southwestward from Faro della Vittoria. ETA messages are required 6 hours in advance for day arrivals and 12 hours in advance for night arrivals. The waiting anchorage area for tankers is the designated area westward of Diga Luigi Rizzo.

DIRECTIONS FOR ENTERING

6B-57 No dangers lie in the approach to Porto di Trieste. Vessels should head for the pilot station, approximately 1 mile westward of Molo Fratelli Bandiera Lighthouse, from which position a course may be laid to the entrance of any of the harbors.

FACILITIES

6B-58 Trieste is the principal city of the Free Territory of Trieste and of a larger and older area known as Venezia Giulia. Trieste, together with that part of the Free Territory of Trieste lying northward of Punta Grossa, is under Italian civil administration. The Yugoslav Zone comprises all the Free Territory of Trieste lying southward of Punta Grossa. The estimated population of Trieste in 1963 was about 283,000.

Trieste is a well built city rising in the form of an amphitheater on the slopes of the Catena del Carso, beyond which are the Julian Alps. The old city lies

between Piazza dell' Unità, facing Porto Doganale, and Monte San Giusto on which stand a cathedral and the old fortress now used as a museum. The new and modern city surrounds the central hill.

Having a modern deep water port adjacent to the markets and raw materials of Central Europe and the middle Danube basin its maritime trade has alternately flourished and declined through political restrictions.

Shipbuilding and repair by three yards amalgamated under Cantieri Riuniti dell'Adriatico (CRDA) is one of the major industries of the city. There are also an important steel mill and two petroleum refineries on the shores of Baia di Muggia.

Berths.—There is approximately 49,000 feet of usable berthing space in the entire harbor with along-side depths up to 10m (33 ft.). Referring to the port plan, the berth particulars are as follows: (Berth numbers are for reference to port plan only.)

Porto Franco Vecchio		
Berth	Usable length (feet)	Depth
1	520	5.5m (18 ft.)
2	495	5.5m (18 ft.)
3,4	750	5.5m (18 ft.)
5	550	5.5m (18 ft.)
6	340	5.8m (19 ft.)
7,8	740	4.5m (15 ft.) to 55m (18 ft.)
9,10	880	5.5m (18 ft.)
11,12	650	5.5m (18 ft.)
13	270	5.5m (18 ft.)
14	645	5.5m (18 ft.) to 6.1m (20 ft.)
15,16	980	5.5m (18 ft.)
17,18	690	5.5m (18 ft.)
19	250	5.5m (18 ft.)
20,21	690	5.5m (18 ft.) to 6.1m (20 ft.)
22,23	980	5.5m (18 ft.)
24	440	4.5m (15ft.)
25	280	3.6m (12 ft.)
26	440	5.5m (18 ft.)

All the above berths have shipside railway tracks and water connections.

Porto Doganale		
Berth	Usable length (feet)	Depth
27	780	3.9m (13ft.) to 4.9m (16ft.)
28	770	3.9m (13ft.) to 4.9m (16ft.)
29	720	8.8m (29ft) to 10.3m (34 ft.)
30	800	4.9m (16ft.) to 6.7m (22ft.)

Molo della Pearcheria		
NE side	510	5.8m (19ft.) to 6.7m (22ft.)
SW side	410	4.9m (16ft.) to 5.8m (19 ft.)
Molo Venezia		
NE side	640	4.9m (16ft.) to 5.8m (19ft.)
SW side	640	4.9m (16ft.) to 5.8m (19 ft.)
Refrigerator	410	4.9m (16ft) to 5.8m (19ft.)

All the above berths have water connections, but only berths No. 29, 30, Molo Venezia, and the Refrigerator have shipside railroad tracks.

Porto Franco Nuovo (Usable length (feet)		
Berth	Usable length (feet)	Depth
31	1,050	3.9m (13ft) to 4.9m (16ft.)
32,33	1,180	7.3m (24ft.) to 8.8m (29 ft.)
34	560	7.9m (26ft.) to 8.8m (29ft.)
35,36	1,180	7.9m (26 ft.) to 8.8m (29ft.)
37,38	1,170	7.9m (26ft.) to 8.8m (29ft)
39,40	1,180	7.9m (26ft.) to 8.8m (29ft.)
41	540	7.9 (26 ft.)
42,43,44, 45 ¹	2,090	7.9m (26ft.) to 8.8m (29ft.)
46,47	1,190	8.8m (29ft.)
48	1,160	8.8m (29 ft.)
Molo dei Le- gnami S side	470	5.2m (17 ft.)
Molo d'Alles- timenti E side	620	8.5m (28 ft.)
W side	620	8.5m (28 ft.)

¹ No. 45 has four penumatic grain handlers

Berths No. 31 to 47 and the inshore half of No. 48 have shipside railroad tracks. All berths have water connections.

In addition to the foregoing there are about 14 berths in Porto Doganale for vessels up to 250 feet in length with a draft of 4.9m (16 ft.) using the Merditerranean moor.

Most of the berths are served by cranes. There are several floating cranes in the port area, the largest having a capacity of 200 tons. Tugs up to 1,000 hp. are available.

Supplies.—All foodstuffs are imported, hence their supply is both limited and expensive.

Potable chlorinated water is supplied through berth hydrants at a pressure normally of about 88 pounds. There are several water barges. Low salinity boiler water is not available.

A supply of coal is available at Berth No. 31 or it can be supplied by lighters.

Imported bunker, Diesel, and lube oil is available at the SIAP and Aquila refineries near Valle di Zaulle, section 6B-45. The delivery rate at the former is from 150 to 350 tons an hour and at the latter, 60 to 70 tons. Bunker oil is supplied also by barge. Diesel and lube oil can be supplied alongside berths by tank trucks.

Repairs.—Major hull and engine repairs can be effected at 3 of the 5 shipyards. Three drydocks can accommodate vessels up to 5,000 gross registered tons.

The largest drydock at Arsenale Triestino is 679 feet long, 98½ feet wide, with 28 feet of water on the sill.

The port has a self-propelled floating crane of 150 tons capacity at 45 feet radius and 50 tons capacity at 108 feet radius. A 620-ton salvage vessel equipped for underwater repairs is available.

Communications.—Trieste is the focal point of three main railway systems connecting the city with all of Europe. There is frequent steamer service to Italian and Adriatic ports and all parts of the world. A new superhighway connects the city with San Sabba, Opicina, and Sistiana. The airfield at Udine, 38 miles northwestward, is used for transport and mail service. A radio station is operated for marine and commercial traffic.

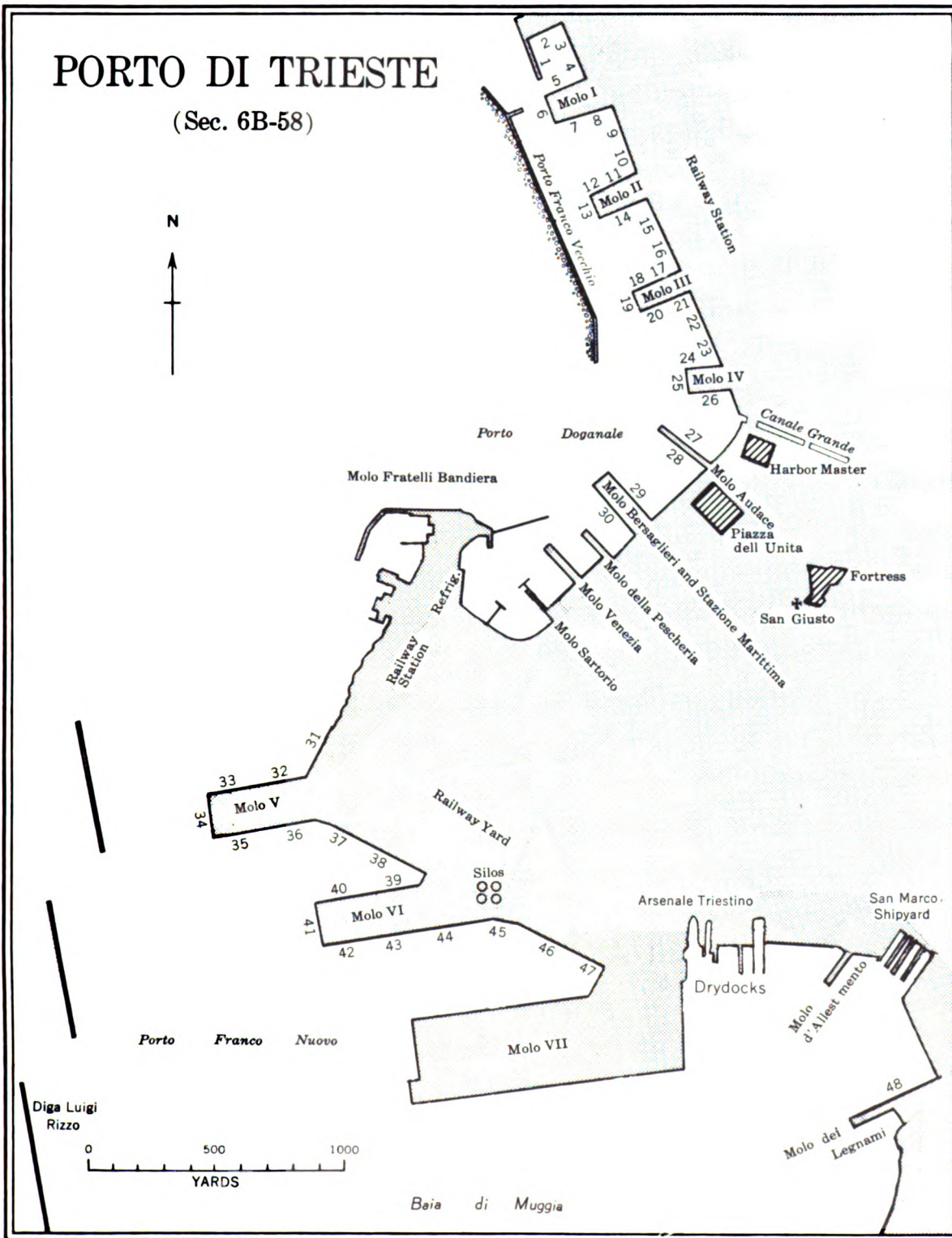
Hospitals.—There are one army and seven public hospitals, one of which will receive seamen. Malaria precautions should be observed from June to October.

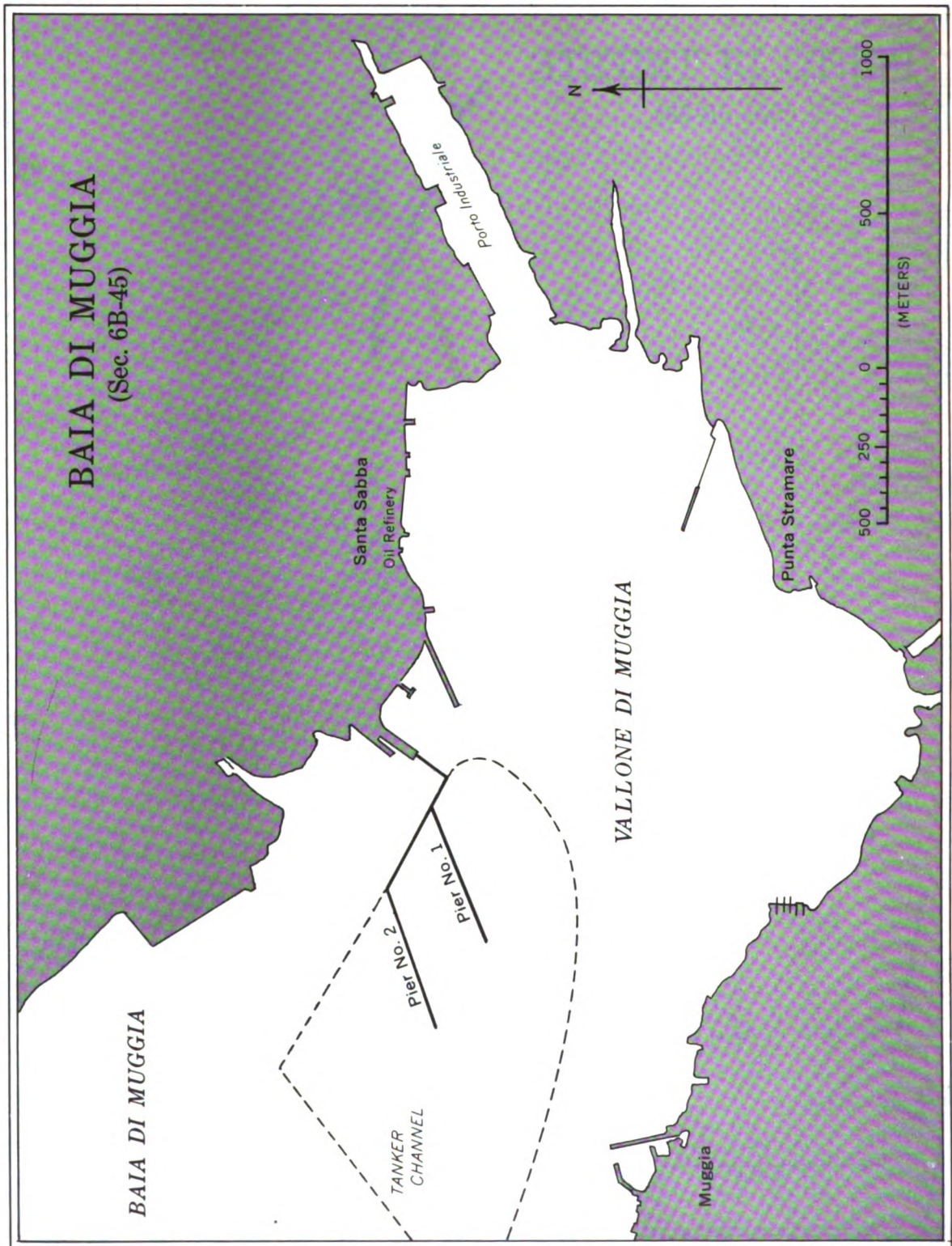
Deratting.—Deratting can be carried out and Deratting Certificates and Deratting Exemption Certificates issued.

PORTO DI TRIESTE

(Sec. 6B-58)

N





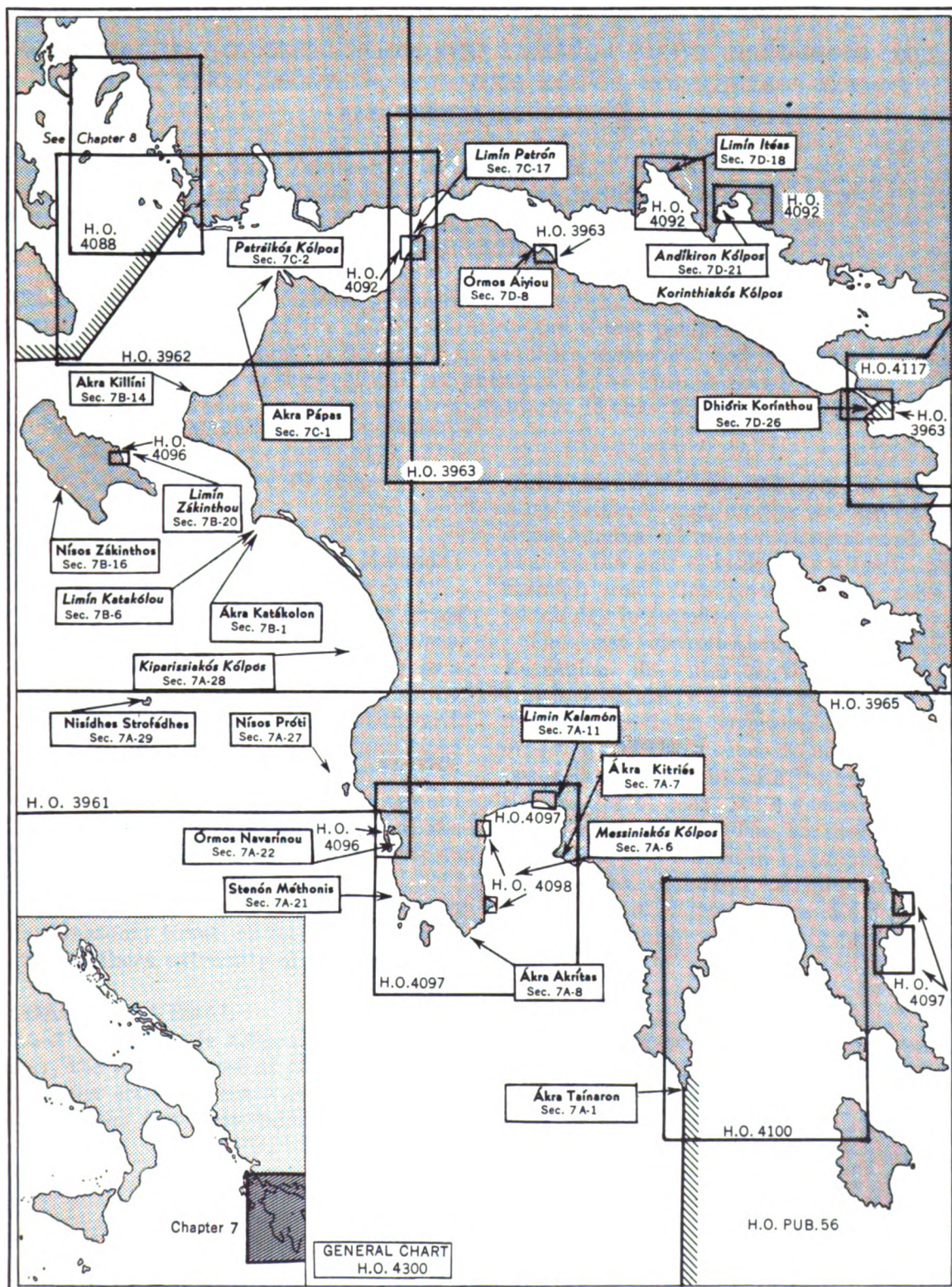


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.

Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 7—GRAPHIC INDEX

CHAPTER 7

WESTERN COAST OF GREECE FROM AKRA TAINARON (MATAPAN) TO NISOS OXIA, INCLUDING NISOS ZAKINTHOS, PATRAIKÓS KÓLPOS, KORINTHIAKÓS KÓLPOS, AND DHIÓRIX KORINTHOS

- Part A. Akra Tainaron to Akra Katákolon.
- Part B. Akra Katákolon to Akra Pápas, including Nisos Zakynthos.
- Part C. Patraikós Kólpos.
- Part D. Korinthiakós Kólpos and Dhiórix Korinthou.

Plan.—The coast in this chapter, comprising the southwestern and western sides of Peloponnisos and the shores of the gulfs separating the Greek peninsula from the mainland, including the Corinth Canal, is described in sequence westward and northward to Akra Pápas, thence eastward to the southeastern entrance of the Corinth Canal.

The coast of Greece eastward of Akra Tainaron is described in H.O. Pub. 56, *Sailing Directions for the Mediterranean*, Volume V.

PART A. AKRA TAINARON TO AKRA KATÁKOLON

7A-1 Akra Tainaron (Cape Matapan) ($36^{\circ}23' N.$, $22^{\circ}29' E.$) is the southern extremity of a dark grayish peninsula which forms the southern extremity of Peloponnisos. From the cape the land rises gradually to a peak, 1,025 feet high, and then falls abruptly to a low narrow isthmus, 3 miles northward. Akra Tainaron appears as a wedge-shaped island when viewed from the eastward or westward, but when viewed from southward it is difficult to distinguish because of the high land northward. The cape is steep-to and there are no off-lying dangers.

Akra Tainaron Light is shown from a square masonry tower, 52 feet high, situated on the southern extremity of the cape.

COAST—GENERAL

7A-2 Messiniakós Kólpos (Gulf of Kalamata), the westernmost of three gulfs that indent the southern coast of Pelopónnisos, lies between two mountainous peninsulas

which terminate, on the eastern side, at Akra Tainaron and, on the western side, at Akra Akrítas, 35 miles northwestward. The head of the gulf is backed by a fertile plain through which flow several rivers, some of which dry in summer.

The coast between Akra Akrítas and Akra Katákolon, 62 miles north-northwestward, trends irregularly northwestward for $25\frac{1}{2}$ miles and contains several indentations and off-lying islands, whence Kiparissiakós Kólpos, a large bight, indents the remainder of this stretch of coast for a distance of about 10 miles eastward. The southern part of this coastline is backed by mountains of moderate height. A narrow coastal plain borders the whole of Kiparissiakós Kólpos, from which the terrain rises steeply to the mountains.

DANGERS

7A-3 This stretch of coast is, for the most part, free of off-lying dangers.

Nisis Karávi, a 47-foot rock, and Nisis Karavopetra, a rock awash, lie 4 miles north-

westward of Ákra Taínaron and $2\frac{3}{4}$ miles offshore. Ákra Akritis, 35 miles northwestward of Ákra Taínaron, is fronted for 3 miles southward by rocks and an islet. With the exception of these dangers, the shores of Messiniakós Kólpos may be safely approached in deep water anywhere to a distance of 1 mile.

Between Ákra Akritis and Ákra Katákolon the 6-fathom curve lies nowhere farther than 1 mile offshore or the same distance seaward of the off-lying islands.

Pilos Reefs, a group of rocky patches with a least depth of 6 fathoms, lie between $\frac{1}{2}$ and $1\frac{1}{4}$ miles offshore of a position off the entrance of Órmos Navarínou, 15 miles northwestward of Ákra Akritis. These reefs break in heavy weather and should be avoided.

Nisídhēs Strofádhēs are a group of rocks and two islets lying 53 miles northwestward of Ákra Akritis and 27 miles offshore. This group is steep-to on all sides except to southeastward where, in 1946, it was reported that shoal water extends about 2 miles.

NAVIGATION—OFFSHORE

7A-4 Northbound.—From a position 3 miles southward of Ákra Taínaron, the following courses will lead to the positions indicated:

To a position 7.5 miles southwestward of Ákra Katákolon Lighthouse, and toward Porthmós Zákinthou, Patraikós Kólpos, and the eastern sides of the Ionian Islands: 300° for 46 miles to a position with the lighthouse on the southern end of Nísos Sapiéntza bearing 045° , distant 2.3 miles; whence 336° for 54.5 miles.

To a midchannel position in the Strait of Otranto with Capo di Otranto Lighthouse bearing 242° , distant 20 miles: 300° for 46 miles to a position with the lighthouse on the southern end of Nísos Sapiéntza bearing 045° , distant 2.3 miles; whence 307° for 45.5

miles to a position with Nísis Stamfáni Lighthouse bearing 045° , distant 6.5 miles; whence 333° for 208 miles.

Navigation information for the ports described in this chapter will be given with the information for the port.

CURRENT AND WIND

7A-5 Current.—The current parallels the coast in a general northwesterly direction and off Ákra Taínaron may reach a velocity of 1 knot. The current is invariably stronger in the channels between the islands.

Wind.—In winter, the winds are rather variable but generally alternate between mild southerly winds and cool northeasterly winds. The change to northeasterly winds occurs usually in a squall with heavy rain and thunder. The northeasterly winds blow from high land and consequently are squally and may reach high velocity locally; for example, the wind blowing out of Messiniakós Kólpos is often strong and squally with sudden changes in direction between northeast and southeast.

The scirocco is most frequent in autumn and spring. Its onset is marked by a sudden rise of 5° to 10° in temperature and about 10 percent in relative humidity.

In summer, northwesterly winds prevail.

Land and sea breezes are experienced in settled weather in winter and increase considerably in spring. Near the coast, land and sea breezes are well developed. The land breeze in many areas is reinforced by winds blowing down from the mountains and may reach force 4. Off the western coast of Pelopónnisos it blows from northward or northeastward, and on the southern coast it blows out of the gulfs.

MESSINIAKÓS KÓLPOS

7A-6 General description.—Messiniakós Kólpos recedes to the northward 19 miles from the parallel of Ákra Akritis (sec. 7A-

8), its western entrance point, situated 35 miles northwestward of Ákra Tainaron. The gulf is deep and free from dangers to a distance of $\frac{3}{4}$ mile off its eastern shore, and to a distance of 1 mile off its western and northern shores.

The peninsula forming the eastern side of the gulf consists of a generally flat-topped mountain chain, which from its highest peak, snow-covered Profitis Ilias, 7,897 feet high and situated 34 miles northward of Ákra Tainaron, descends in elevation southward. In clear weather these mountains may be sighted from a great distance.

The northern shore of the gulf is part of a fertile plain through which flows Potamós Pámisos and several streams.

The western shore of the gulf is a peninsula formed by the slopes of Óros Likódhimos (sec. 7A-25), 3,146 feet high, situated 13 miles northward of Ákra Akritas, and those of the hills between the mountain and the cape.

See also section 7A-2.

7A-7 Eastern side of Messiniakós Kólpos.—Between Ákra Tainaron, section 7A-1, and Ákra Gróssó, 8 miles northwestward, the coast, which is fringed by sunken rocks in places, recedes northeastward forming a light. Órmos Marmari and Órmos Iali are coves situated $2\frac{1}{2}$ miles northward and $6\frac{1}{4}$ miles north-northwestward, respectively, of Ákra Tainaron, and contain shipping facilities for coasters. A light is shown from the latter port.

Ákra Gróssó ($36^{\circ}29' N.$, $22^{\circ}22' E.$) is the southwestern extremity of a conspicuous promontory, 1,235 feet high, which rises steeply from the sea. The face of this promontory between Ákra Gróssó and Ákra Dhrósos, $2\frac{3}{4}$ miles north-northwestward, consists of steep-to reddish cliffs. Ákra Tigáni, the northern extremity of the promontory, is white and steep; it has the appearance of an islet when viewed from a distance.

The coast between Ákra Tigáni and Ákra Trakhilas, $14\frac{1}{2}$ miles northward, is steep, rugged, and indented by several small bays. Óros Miniátika, a flat-topped mountain, 3,530 feet high and situated 3 miles northeastward of Ákra Tigáni, is a conspicuous landmark.

Órmos Mézakos, a port of call for coasters, is located close eastward of Ákra Tigáni. The port is marked by a light.

Órmos Limeniou, the best natural harbor in the gulf, recedes eastward $1\frac{1}{4}$ miles from the coast at a position $9\frac{1}{2}$ miles northward of Ákra Tigáni. The southern entrance point is marked by a light.

Ákra Trakhilas is the extremity of a narrow peninsula that projects abruptly $\frac{3}{4}$ miles from the coast.

The coast between Ákra Trakhilas and Ákra Kitriés, 12 miles northwestward, trends first north-northwestward and thence turns abruptly westward. A light is shown at Selenitsa, a coastal village 3 miles northward of Ákra Trakhilas. A rock, with a depth of 5.5m (3 fm) over it, lies about 400 yards west-southwestward of Selenitsa Light.

Ákra Tsaknova, a conspicuous projecting peninsula located $11\frac{1}{4}$ miles northwestward of Selenitsa, is fronted westward and northward for $1\frac{1}{2}$ mile by depths of 5.5m (18 ft.) to 7.3m (24 ft.)

Kardhamili, a village and port for coasters, is situated $3\frac{1}{4}$ miles north-northwestward of Ákra Tsaknova. An islet with a chapel lies close offshore and southward of the port. A light is shown near the jetty at Kardhamili.

The coast in this vicinity is backed by several conspicuous summits, the principal one being Profitis Ilias, section 7A-6.

Ákra Kitriés ($36^{\circ}55' N.$, $22^{\circ}08' E.$), a conspicuous round promontory 1,148 feet high, is the westernmost point of the eastern side of Messiniakós Kólpos. Depths as great as

100 fathoms lie only 1/2 mile off this steep-to promontory. A light is shown from the western extremity of the promontory.

The coast from the root of the promontory of Ákra Kitriés trends 5 1/2 miles northward, thence 1 3/4 miles westward to Limín Kalamón, at the head of the gulf. Several coves indent this stretch of coast which is fringed closely with some above-water rocks.

7A-8 Western side of Messiniakós Kólpos.—Ákra Akritas (36°43' N., 21°52' E.), the western entrance point of the gulf, is a steep rugged pinnacle connected to the mainland northward by a low narrow isthmus.

Islets off-lying Ákra Akritas.—Nízos Venétiko, a steep rugged island 570 feet high and about 1 mile long, is situated about 1 mile south-southeastward of Ákra Akritas. Rocks extend 200 yards southward from the southwestern and southeastern extremities of the island, and a reef with depths of 5.5m (3 fm) to 10m (5 1/2 fm) extends about 1/2 mile northward from its northern extremity.

A light is shown near the northern extremity of Nízos Venétiko.

Nisídhēs Avgó, a group of three above-water rocks, the southernmost and largest of which is 30 feet high, lies nearly 1 mile southward of Nízos Venétiko.

A current affected by the wind sometimes sets through the passage between these islets and Ákra Akritas with a velocity of 1 1/2 to 2 knots.

The coast between Ákra Akritas and Ákra Livadhiés, 6 1/2 miles northeastward, is free of off-lying dangers. In Órmos Némi, a bight close southwestward of Ákra Livadhiés, the 6-fathom curve lies 1,300 yards offshore.

Ákra Livadhies, from which a light is shown, is a prominent cape extending eastward from a rocky plateau on which stand the conspicuous ruins of a castle.

The town of Koróni extends along the shore northwestward of the ruins. Because of a strong current experienced at times off this

cape, vessels from southward should give it a prudent berth.

Limín Koróni, fronting the village of the same name, is protected to eastward by a breakwater, 430 yards long, and has depths of 1.8m (6 ft.) to 5.5m (18 ft.). The head of the breakwater is marked by a light. An area of foul ground is charted close northward of the light.

The coast, which trends northward for 10 miles from Ákra Livadhiés to Ákra Petalídhion, is fringed in places by sunken rocks and shallow patches, none of which extends farther than 1/2 mile offshore. The conspicuous summit of Óros Likódhimos, sections 7A-6 and 7A-25, stands 4 miles southwestward of Ákra Petalídhion.

Ákra Petalídhion is a low point which can be identified by a white church standing on it. An above-water rock surrounded by several awash lies 150 yards northeastward of the point.

Órmos Petalídhion is a small bight entered close northward of Ákra Petalídhion. The village of the same name is situated on the southern shore of the bight. A light is shown close eastward of the village.

7A-9 Northern side of Messiniakós Kólpos.—From Ákra Petalídhion, this shore trends northward and eastward in an arc to Limín Kalamón, 9 miles east-northeastward, and is fronted for 1,300 yards in places by depths of less than 9.1m (5 fm). Many streams, most of which dry in summer, enter the gulf through this stretch of coast. The mouth of Potamós Pámisos, the largest river in this area, is located at midlength of this coastal stretch. A submarine pipeline extending 240 yards offshore is located about 2 miles west-northwestward of Limín Kalamon entrance. Three mooring buoys, some lighted, are located at the seaward end of the pipeline.

ANCHORAGES IN MESSINIAKÓS KÓLPOS

7A-10 Órmos Limeníou (sec. 7A-7).—In 10 fathoms in the southern part of the bay.

Kardhamilli (sec. 7A-7).—In about 12.8m (7 fm) off the village and under the lee of the islet southward of the port.

Ormos Almiro, situated 5 miles northward of Akra Kitries. —In 12.8m (7 fm) about 650 yards off the village.

Ormos Nemi (sec. 7A-8).—In 16.5m (9 fm) to 18.3m (10 fm) over sand about 1/2 mile offshore.

Limin Koroni (sec. 7A-8).—In 14.6m (8 fm) to 18.3m (10 fm) over mud, about 1/2 mile northeastward of the head of the breakwater.

Ormos Petalidhion (sec. 7A-8).—In 10.9m (6 fm) to 12.8m (7 fm) over sand and mud about 2/3 mile north-northeastward of the light structure. Anchoring is prohibited southward of this position.

Potomos Pamisos (sec. 7A-8).—In 14.6m (8 fm) about 1 mile off the river mouth.

Limin Kalamon.—Section 7A-15.

LIMIN KALAMON

Position: 37°01'N., 22°07'E.

Depths:

Entrance, 8.5m (28 ft.).

Quays, 1.5m (5 ft.) to 7.9m (26 ft.).

Port plan: Section 7A-19.

7A-11 Limin Kalamón, situated in the northeastern part of Messiniakós Kólpos, consists of a breakwater-protected quayed harbor. The principal part of the town of Kalámai stands about 1 mile northward of the harbor and on the eastern bank of a river which discharges close westward of the harbor.

7A-12 Navigation — From southeastward.—From a position on the coastal track with Akra Tainaron Lighthouse bearing 080°, distant 4 miles, course 336° for 35 miles to a position 1 mile westward of Akra Kitriés Lighthouse, whence 004° for 6 miles leads to the breakwater entrance.

From southwestward.—From a position on the coastal track with Akra Akritas bearing 347°, distant 6.8 miles, course 022° for 27 miles leads to the breakwater entrance.

7A-13 Depths.—There is a depth of 8.5m (28 ft.) at the entrance; and in the western and southern parts of the harbor; and depths of 5.5m (18 ft.) to 7.6m (25 ft.) exist alongside the quays; silting within the entrance to the harbor prevents ships of more than 24 feet from berthing alongside.

7A-14 Landmarks.—A conspicuous ancient citadel stands on a wooded hill close northward of the harbor. There is a prominent flour mill at the western side of the harbor. The plain on which the town is built is backed by hills to northward and eastward, but the land is low and flat to westward and northwestward.

7A-15 Anchorage.—Vessels can anchor outside the breakwaters in about 21.9m (12 fm) over sand. The harbor will not accommodate large vessels at anchor.

7A-16 The harbor is formed by two breakwaters. The western and larger breakwater, which is 3,494 feet long and is quayed on its inner side, extends southward, south-eastward, and thence eastward from the shore at the western side of the harbor.

The eastern breakwater, 1,275 feet long, extends southward from the shore for half its length and then southwestward for the remainder. Nearly all of this breakwater is awash except for a concrete block marking its extremity.

The entrance to the harbor, between the heads of the breakwaters, is 550 feet wide.

A mole about 930 feet long projects southward from a position midway between the roots of the two breakwaters, dividing the harbor into two parts. The western part is quayed and will accommodate large vessels; the eastern part is used by sailing craft.

7A-17 Lights.—The head of each breakwater and that of the mole are each marked by a light.

7A-18 Pilotage is compulsory for all merchant vessels. Vessels are boarded by the pilot about $\frac{1}{2}$ mile outside the breakwaters; pilots will take vessels in at night, if necessary.

7A-19 FACILITIES.—Kálamái, situated on the eastern bank of Potamós Nédhon, is the most important town in Messiniakós Kólpos. The town, which is well laid out, is surrounded by vineyards and olive groves and is the site of the ancient acropolis of Pharae. Population is about 40,000. The United States is represented by a consular clerk.

Berths.—The usable berthing lengths and along-side depths are as follows: (Berth numbers are for reference to the port plan only).

Berth	Usable length (feet)	Depth
1	300	1.5m (5 ft.)
2	1,350	4.5m (15 ft.) to 6.4m (21 ft.)
3	490	4.5m (15 ft.)
4	430	3.9m (13 ft.) to 7.9m (26 ft.)
5	690	5.8m (19 ft.) to 7.9m (26 ft.)
	540	5.5m (18 ft.) to 7.6m (25 ft.)

Several lighters and a 7-ton crane are available. Two portable grain unloaders are used to discharge at Berth 5.

Only minor repairs can be undertaken. A diver is available.

Fresh water is piped to the quays. Coal, fuel oil, and Diesel oil are available in small quantities. Staple and fresh provisions are obtainable.

Kalamai is connected to the telephone, telegraph, and railway systems. There is frequent steamer connections with Greek, European, and United States ports.

There are three hospitals having a total capacity of 50 beds.

LANDMARKS—COASTAL FEATURES, WESTERN SIDE OF PELÓPONNISOS

7A-20 The coast between Ákra Akritis (sec. 7A-8) and Ákra Soukóuli, 10 miles northwestward, recedes northeastward at about its midlength to form a bay with a sandy beach on its northern shore. Ákra Kolivri, the western entrance point of this bay, is the extremity of a promontory, 228 feet high, having the appearance of a round islet. Islets, rocks and shallow water front this stretch of coast for a distance of 800 yards in places.

Ákra Soukóuli ($36^{\circ}49'$ N., $21^{\circ}42'$ E.), 53 feet high, is a detached islet closely off-lying to southward the extremity of a peninsula

to which it is connected by a causeway. The ruins of a fortress are visible on the promontory and a tower stands on the cape. The town of Methoni is situated $\frac{3}{4}$ mile north-northeastward of Ákra Soukóuli. From the eastern side of the peninsula, a mole extends about 100 yards eastward to an above-water rock, on which stands a marble pillar, and continues eastward for another 100 yards to form Methoni Harbor. The head of this mole is marked by a light. A pier, 164 feet in length, with a depth of 0.9m (3 ft.), extends southward from about 400 yards northward of the molehead.

Reef.—A rocky steep-to ridge with uneven depths of 4.5m (15 ft.) to 10.3m (34 ft.) extends 1,200 yards southward from Ákra Soukóuli and to within 600 yards of the northern extremity of Nisos Sapiéntza, section 7A-21.

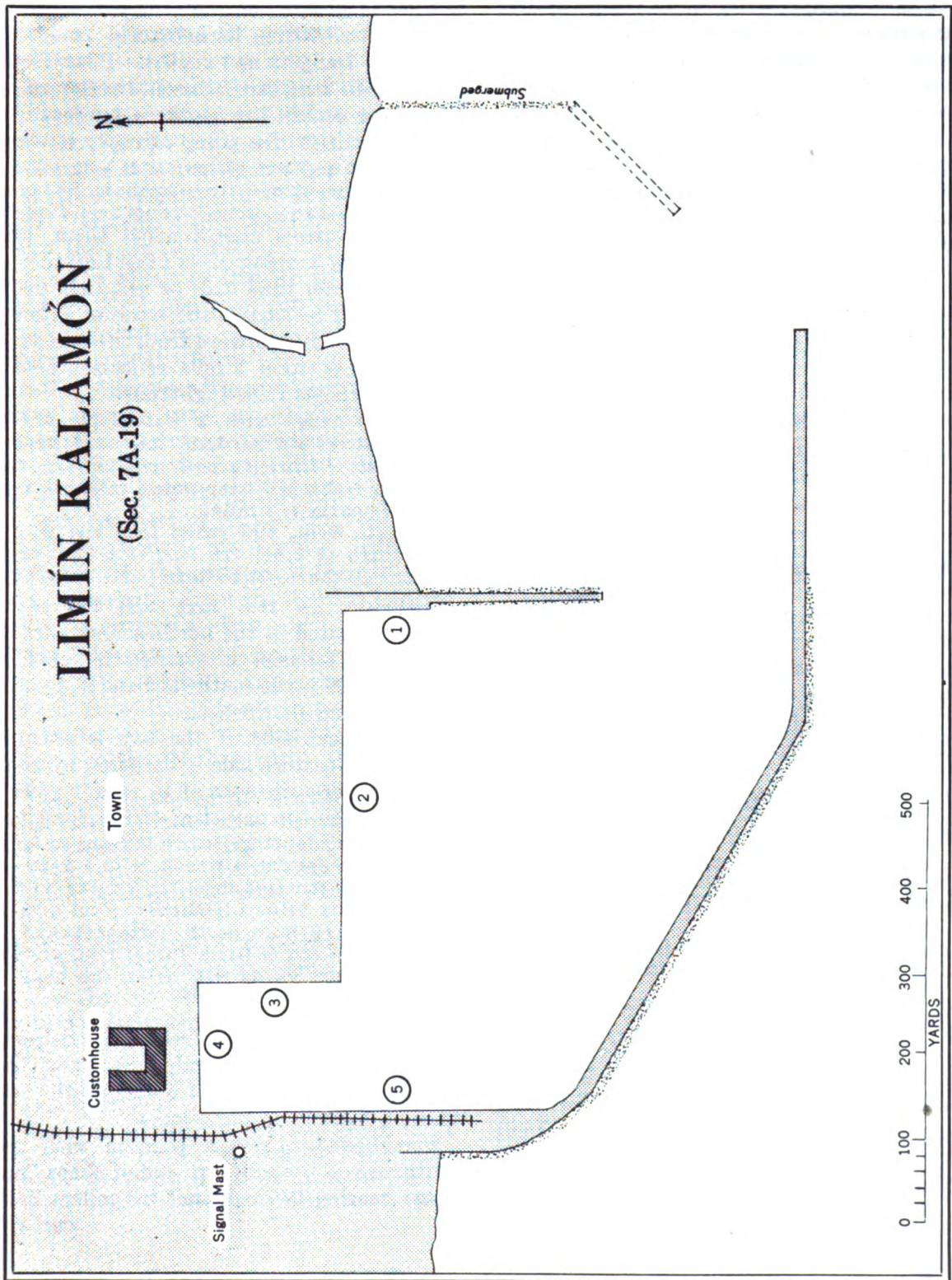
The coast between Ákra Soukóuli and the southern entrance point of Órmos Navarínou, 5 miles northward, is rocky, steep-to, and is fronted closely by several islets. Óros Áyios Nikólaos, 1,588 feet high, is the summit of a range of hills extending from Methóni to the entrance of Órmos Navarínou.

For the description of the coast northward of Órmos Navarínou, see section 7A-27.

OFF-LYING ISLANDS

7A-21 Nisos Sapiéntza, a narrow island, 740 feet high and $3\frac{1}{2}$ miles long in a north-south direction, lies with Ákra Karsí, its northern extremity, nearly 1 mile southward of Ákra Soukóuli, from which it is separated by Stenón Methonis, see below. The island appears wedge-shaped from northwestward. An elevated spur projects $\frac{2}{3}$ mile eastward from the northeastern part of the island. Shallow water extends from the northern side of this spur for $\frac{1}{4}$ mile, leaving a passage about $\frac{1}{3}$ mile wide between it and the shallow water extending from the mainland northward. Porto Longó, used by small vessels with local knowledge, is situated on the southeastern part of the island. The northern side of its entrance is encumbered by several islets. Several dark colored islets and above-water rocks lie close off the southern extremity of the island.

Lights.—A light is shown on Ákra Karsí. A light is shown on the southernmost summit of the island.



Nisos Skhiza, the largest of the three off-lying islands, lies with its northern extremity $1\frac{3}{4}$ miles southward of **Ákra Kolivri**. The island which is $3\frac{1}{2}$ miles long is rocky and barren, rising to a height of 644 feet near its northern end. **Skhíza Harbor**, a narrow indentation in the southwestern side of the island, is used as an anchorage by small vessels with local knowledge. A detached 8.3m (4 $\frac{1}{2}$ fm) reef lies in the entrance. **Arnatsi Rocks**, the largest of which is 30 feet high and blackish, lie $\frac{1}{2}$ mile off the eastern coast of **Nisos Skhiza**.

Nisos Ayía Mariáni, a rocky, barren islet, 100 feet high, lies midway between the two foregoing islands. Shallow water fringes the islet for a distance of 275 yards in places.

Stenón Methonis, the passage between the northern extremity of **Nisos Sapiéntza** and the rocky ridge extending from **Ákra Soukouli**, has a least depth of 12.8m (7 fm) and a least width of $\frac{1}{4}$ mile. Vessels bound to the western side of **Pelopónnisos** from **Messiniakós Kólpos** can reduce distance by about 7 miles by using the passage between **Ákra Akritis** and **Nisos Venétiko** (sec. 7A-8), and then proceeding through **Stenón Methonis**. Vessels using this route should keep in midchannel between the shallow water extending from the mainland and from the spur of **Nisos Sapiéntza**, and then pass about 200 yards northward of **Ákra Karsí**.

ÓRMOS NAVARINOU (NAVARIN BAY)

Position: Entrance, $36^{\circ}54'N.$, $21^{\circ}40'E.$

Depths:

Entrance, 42m (23 fm) to 75m (41 fm).

Bay, 13.8m (7 $\frac{1}{2}$ fm) to 57m (31 fm).

Mole at **Pilos**, 2.1m (7 ft.)

Tide: Range, 0.5 foot.

7A-22 General description.—**Órmos Navarinou**, a semi-circular bay with a deep water width of about $1\frac{3}{4}$ miles, is entered between a point 5 miles northward of **Ákra Soukouli** and **Nisis Pilos**, $\frac{3}{4}$ mile north-northwestward. The bay is fronted by **Nisos Sfaktiria**, a narrow steep-cliffed island, which completely shelters it from westward; it is the largest harbor in **Pelopónnisos** and affords anchorage to the largest vessels. The town

of **Pilos** is situated on the southern shore of the bay close within its entrance.

7A-23 Dangers and depths.—**Pilos Reefs**, lying $1\frac{1}{4}$ to 2 miles south-southwestward of **Nisis Pilos** and in the southern approach to the bay, consist of a group of rocky patches with a least depth of 10.9m (36 ft.). In strong wind, seas break heavily over them. Because of this and because they have not been closely examined, vessels should avoid them, and may do so by keeping **Nisis Pilos Lighthouse** bearing greater than 028° or less than 006° .

A group of rocks, two above water, extends about 100 yards westward from the mainland shore at a position 1 mile south-southeastward from **Nisis Pilos Lighthouse**.

A rocky ledge with a least depth of 7m (23 ft.) extends 500 yards northwestward from the southern entrance point of the bay, reducing thereby the deep water entrance to a width of nearly $\frac{1}{2}$ mile.

Sfaktiria Reef, 400 yards long and with a least depth of 5.5m (18 ft.), lies 680 yards offshore in the northwestern part of the bay.

Khelonisi, 24 feet high and 250 yards long, is situated in the northeastern part of the bay. The islet is fronted by shallow water for 300 yards southward and 250 yards westward and northward.

The western side of the bay is steep-to whereas its eastern side is bordered by shallow water for a distance of $\frac{1}{2}$ mile in places. The depths in the bay clear of the described dangers vary from 13.8m (7 $\frac{1}{2}$ fm) to 5.7m (31 fm), except for a wreck, with a depth of 44m (24 fm), that lies about $1\frac{3}{8}$ miles northward of **Nisis Pilos Lighthouse**. Foul ground lies about $\frac{1}{2}$ mile north-northeastward of the northern end of **Nisis Pilos**. Foul ground lies about 380 yards 325° from the head of the mole at **Pilos**.

7A-24 Navigation.—From the positions on the coastal track indicated, the following courses lead to a position 0.5 mile southwestward of **Nisis Pilos Lighthouse**.

Northbound.—From a position with the lighthouse on the southern end of **Nisos Sapiéntza** bearing 045° , distant 2.3 miles: 350°

for 10 miles to a position with Nísos Pílos Lighthouse bearing 045°; whence 045° for 1.7 miles.

Southbound.—From Porthmós Zákinthou in a position with Akra Katokólou Lighthouse bearing 045°, distant 7.5 miles: 156° for 35 miles to a position with Akra Ourá, the southern extremity of Nísos Próti (sec. 7A-27), bearing 066°, distant 2.7 miles; whence 131° for 10.5 miles.

From the Strait of Otranto in a position with Akra Kerí, the southern extremity of Nísos Zákinthos (sec. 7B-17), bearing 086°, distant 10 miles; whence 131° for 67 miles.

7A-25 Aspects.—Nísos Sfaktiría, the eastern steep-to coast of which forms the western side of Órmos Navarínou, is a narrow island, $2\frac{1}{2}$ miles long, which rises to a height of 499 feet at its northeastern part. The southern part of its western coast consists of conspicuous steep white cliffs that help to identify the entrance to the bay. The island is separated from the mainland northward by a narrow shallow strait.

Nísos Pílos, 121 feet high and rocky, lies close off the southern extremity of Nísos Sfaktiría to which it is connected by a spit with depths of 9.1m (5 fm) to 18.3m (10 fm) and on which stand several above-water rocks.

A light is shown on the southeastern side of the islet. A prominent monument stands close northward of the lighthouse.

It was reported (1962) that a pilot is available and boards after passing Nísos Pílos.

Óros Likódhimos, a conspicuous conical peak 3,132 feet high, is situated 8 miles eastward of the bay and is a helpful landmark for vessels approaching from westward. See section 7A-6.

Pílos, population about 2,600, is located on the southern shore of the bay close within its entrance. A mole, alongside which there is a depth of 2.1m (7 ft.), extends 100 yards from the western part of the town, forming a small harbor. The head of this mole is marked by a light.

A light is shown on Akra Neokastron about $\frac{3}{4}$ mile east-northeastward of Nísos Pílos.

Neókastron, a conspicuous castle, stands close westward of Pílos.

At Gíalova on the northeastern shore of the bay there is a stone pier with shallow water alongside it. A fuel oil bunkering ship is permanently anchored about $1\frac{1}{4}$ miles west-southwestward of the head of the pier. Fresh water can be supplied by barge. No tugs are available.

A conspicuous chimney stands at Gíalova.

A light is shown on the south side of Khelonisi.

7A-26 Anchorages.—Vessels can find sheltered anchorage almost anywhere in Órmos Navarínou in depths of 28m (15 fm) to 57m (31 fm). Anchoring in the northern part of the bay, northeastward of Sfaktiría Reef, is not recommended because of sunken wooden wrecks.

In summer, large vessels usually anchor about $\frac{1}{4}$ mile northward of Pílos in depths of about 18.3m (10 fm); however a foul patch lies close westward. Small vessels can anchor closer inshore.

In winter, vessels usually anchor about $\frac{1}{3}$ mile southwestward of Gíalova in 18.3m (10 fm) to 24m (13 fm). There is less swell here than in other parts of the bay.

There is also a suitable anchorage in the northwestern part of the bay in a position about $\frac{1}{3}$ mile east-southeastward of the northeastern end of Nísos Sfaktiría. The depth is about 24m (13 fm) over good holding mud; however, the proximity of this anchorage to Sfaktiría Reef and the foul ground northeastward renders this position less desirable than the other.

LANDMARKS—COASTAL FEATURES, WESTERN SIDE OF PELÓPONNISOS— (Continued)

7A-27 Coast.—From the northern end of Órmos Navarínou the coast trends $7\frac{1}{2}$ miles north-northwestward to Akra Máraithos. A conspicuous fortress in ruins stands on a hill, 456 feet high, close northward of Nísos Sfaktiría. This stretch of coast is fringed with rocks and shallow water for a distance of nearly $\frac{1}{2}$ mile in places.

Ákra Márathos ($37^{\circ}03' N.$, $21^{\circ}34' E.$) is a low rocky cape supporting a village and backed by cultivated plains. A mountain range with a prominent summit, 3,957 feet high, parallels the coast about 8 miles eastward of the cape. A light is shown on the cape.

Nísos Próti, an irregular steep-to wooded island 605 feet high and 2 miles long, lies 1,250 yards westward of **Ákra Márathos** from which it is separated by **Stenón Prótis**. This passage is narrowed by a shoal with a depth of 8.6m (4 3/4 fm) that extends westward from **Ákra Márathos**, and midway between the western edge of this shoal and **Nísos Próti** there is a rocky patch with a least depth of 9.1m (5 fm). With these exceptions the passage has a least depth of 12.8m (7 fm).

The village of **Ayía Kiriakí**, which has a small pier, is situated 3 1/2 miles northward of **Ákra Márathos**.

7A-28 Kiparissiakós Kólpos.—Between **Ákra Kounellos**, 6 1/2 miles northward of **Ákra Márathos**, and **Ákra Katákolon**, 31 miles north-northwestward, the coast recedes eastward about 10 miles forming **Kiparissiakós Kólpos**. The shore of this gulf northward of **Órmos Kiparissías** (see below) consists for the most part of sandy beaches pierced by several streams. Along the northern part of the gulf there is a chain of lakes separated from the sea by a narrow tree-covered strip of sand. There are no off-lying dangers and the 6-fathom curve lies nowhere farther than 3/4 mile offshore.

A southerly or southeasterly counter current of 0.4 to 0.6 knots is usually experienced in the gulf.

Órmos Kiparissías is a small indentation 7 1/2 miles northeastward of **Ákra Kounellos**. A breakwater 300 yards long forms a harbor in which there are depths of 3.6m (12 ft.) to 7.3m (24 ft.). The town of the same name

lies close inland of the harbor and constitutes a conspicuous landmark for vessels approaching from westward or northwestward. The harbor is a small anchorage protected by a dilapidated pier. It is reported that motor launches have difficulty approaching the shore. One 5-ton lighter is used to work cargo. The pier is about 130 feet long; depths are about 4.5m (15 ft.) at the entrance and 2.4m (8 ft.) within the harbor.

7A-29 Off-lying islets—Nisídhēs Strofádhēs ($37^{\circ}15' N.$, $21^{\circ}00' E.$), a group of two islets, lies 30 miles west-northwestward of **Ákra Márathos**.

Nisís Stamfaní, the southeastern and larger islet, is 36 feet high and about 1/2 mile long. A fortified monastery of white stone stands near a cove on its northern side where there are two piers for use by boats. A light is shown on the summit of the western end of the islet.

Arpia (Harpy Rock), the other islet, lies 1/2 mile northward of the larger one and is connected to it by a ridge of sunken rocks.

ANCHORAGES ON THE WESTERN SIDE OF PELÓPONNISOS, SOUTHWARD OF AKRA KATAKOLON

7A-30 Methoni (sec. 7A-20).—In 12.8m (7 fm) over sand in the middle of the bay, about 1/4 mile eastward of the tower on **Ákra Soukouli**.

Phinikus.—In 12.8m (7 fm) to 14.6m (8 fm) over sand off the village of the same name, situated 3 miles east-northeastward of **Ákra Kolivri** (sec. 7A-20).

Órmos Navarinou.—Section 7A-26.

Stenon Protis (sec. 7A-27).—In 12.8m (7 fm) over sand and rock about 1/3 mile southwestward of **Ákra Marathos**.

Ayía Kirakí (sec. 7A-27).—In about 10.1m (5 1/2 fm) over sand 1/4 mile off the village.

Órmos Kiparissías (sec. 7A-28).—In 28m (15 fm) about 1/2 mile offshore of the port.

Nisídhēs Strofádhēs (sec. 7A-29).—In 7

to 15 fathoms over sand and weed northward of the monastery on Nísos Stamfaní. This anchorage should be approached with care because there are depths of over 50 fathoms about 600 yards from the northeastern extremity of the islet.

PART B. AKRA KATÁKOLON TO AKRA PÁPAS, INCLUDING NÍSOS ZÁKINTHOS

7B-1 Akra Katákolon ($37^{\circ}38' N.$, $21^{\circ}18' E.$), the extremity of a peninsula forming the northern entrance point of Kíparissiskós Kólpos, is a low tongue of land which is fringed on all sides by rocks and shallow water for a distance of 750 yards in places. The peninsula extends 2 miles southward from the western coast of Pelóponnisos in a position 31 miles north-northwestward of Akra Kounellos, section 7A-28.

A light is located about $1/3$ mile northward of Akra Katakolon.

COAST—GENERAL

7B-2 From Akra Katákolon the coast trends northward and thence northwestward to Akra Tripiti, 16 miles northwestward, forming a bight with a low sandy shore, inland from which is a cultivated plain. Akra Tripiti is the southern end of a headland with a sea face, 6 miles long, which is cliffy with a sandy beach; it is backed by high land.

Akra Tripiti, the westernmost point of Pelóponnisos, is separated from the southeastern end of Nísos Zákynthos, 9 miles southwestward, by Porthmós Zákynthou.

From the headland northward of Akra Tripiti, the coast trends 20 miles northeastward to Akra Pápas, receding slightly to form a bight. This stretch of coast is low and sandy and is backed by wooded and cultivated land. Near Akra Pápas, the land rises in dark rounded hills.

Nísos Zákynthos is described in section 7B-16.

DANGERS

7B-3 Mesokanáli Reef (Montague Rocks) with a least depth of $2\frac{3}{4}$ fathoms and steep-to, lies near the middle of Porthmós Zákynthou in a position 7 miles northwestward of Akra Tripiti. The latter cape in range with Akra Katákolon, bearing 144° , leads $1\frac{1}{2}$ miles northeastward of Mesokanáli Reef.

Another $2\frac{3}{4}$ -fathom patch was reported (1959), to lie about 1 mile westward of Mesokanali Reef.

Caution.—These reefs should be given a wide berth because of strong current in the vicinity.

There are several islets, rocks, and shoals lying close offshore along this stretch of coast, but, with the exception of Mesokanáli Reef, there are no dangers outside the 6 fathom curve, which is nowhere farther than $1\frac{1}{2}$ miles offshore.

NAVIGATION

7B-4 Offshore.—The offshore track between the southern end of Pelóponnisos and the Strait of Otranto is described in section 7A-4.

Eastbound.—The following courses from the positions indicated lead to a position with Akra Pápas Lighthouse bearing 126° , distant 2.5 miles, the entrance into Patralkós Kólpos:

From Stretto di Messina in a position with Capo Spartivento Lighthouse bearing 000° , distant 2 miles: 098° for 224 miles to a position with Akra Moúnda, the southeastern extremity of Nísos Kefallinia, bearing 000° , distant 5.4 miles; whence 058° for 30 miles. This track passes Akra Skinári, the northern extremity of Nísos Zákynthos and which is steep-to, at a distance of 2 miles.

From Malta Channel in a position with Cozzo Spadaro Lighthouse, on the southeastern extremity of Sicily, bearing 000° , distant 5 miles: 073° for 283 miles to a position with Akra Moúnda, the southeastern extremity of Nísos Kefallinia, bearing 000° , distant 5.4 miles; whence 058° for 30 miles.

This track passes Ákra Skinári, the northern extremity of Nísos Zákynthos and which is steep-to, at a distance of 1 mile.

Inshore—Northbound.—From a position on the coastal track with Ákra Katákolon Lighthouse bearing 045°, distant 7.5 miles, the following courses will lead to the entrance of Patraikós Kólpos in a position with Ákra Papás Lighthouse bearing 126°, distant 2.5 miles: the coastal track continued on course 336° for 18 miles to a position with Ákra Tripiti bearing 066°, distant 2.8 miles; whence 000° for 7 miles to a position with Nísos Kavkalídhá Lighthouse bearing 090°, distant 3 miles; whence 036° for 22 miles.

The position with Nísos Kavkalídhá Lighthouse bearing 090°, distant 3 miles, can be used as the departure for any position on the western mainland coast of Greece or on the eastern sides of the Ionian Islands.

Navigation information for the ports described in this chapter will be given with the information for the port.

CURRENT AND WIND

7B-5 Current.—The current parallels the coast in a general northwesterly direction in the order of 0.2 to 0.4 knot, but it is invariably stronger in the passages between the islands. In the vicinity of Ákra Papás the current is caused almost entirely by wind; with fresh northeasterly winds it sets westward at a velocity of 1.5 knots or greater, and eastward with northwesterly wind.

Wind.—The description given in section 7A-5 applies generally for the area embraced in Part B of this chapter.

LIMIN KATAKÓLOU (KATAKOLON HARBOR)

Position: 37°39' N., 21°19' E.

Depths:

Entrance, 3¼ to 4 fathoms.

Quays, 2 to 12 feet.

7B-6 Limin Katakólon, situated on the eastern side of the peninsula terminating at

Ákra Katákolon at the northern end of Kiparissiakós Kólpos, consists of a roadstead and a breakwater-enclosed harbor about 600 yards in diameter. It is the port for Pírgos, 7 miles east-northeastward, one of the largest towns in Pelóponnisos.

7B-7 Navigation.—The following courses from the positions on the coastal track indicated lead to a position 2 miles southward of Ákra Katákolon:

Northbound, from a position with Ákra Ourá (Nísos Próti, sec. 7A-27) bearing 066°, distant 2.7 miles; 345° for 36 miles.

Southbound, from a position with Ákra Tripiti bearing 066°, distant, 2.8 miles; 137° for 18 miles.

Ákra Katákolon should not be closed nearer than 0.5 mile.

7B-8 Depths.—There are depths of 3¼ to 4 fathoms in the entrance of and in the southeastern part of the harbor. The remainder of the harbor is shallow. There is a depth of 6 feet at the outer end of the northern breakwater and depths of 2 to 12 feet along the inner face of the southern breakwater.

7B-9 Landmark.—The best landmark in the vicinity is a conspicuous ruined castle located 2 miles northward of Ákra Katákolon and close inland. A radio mast, marked by red lights, stands about 6 miles east-northeastward of Ákra Katakolon.

7B-10 Anchorage.—The usual anchorage for large vessels is in a position ¼ mile north-northeastward of the head of the southern breakwater.

7B-11 Harbor.—The harbor is formed by two breakwaters extending eastward from the town; the northern one is 125 yards long, and the southern one, 750 yards long, is quayed on its inner side. The outer 175 yards of the southern breakwater turns northeastward.

The head of the southern breakwater is marked by a light shown from a post on a hut. Ákra Katákolon Light is described in section 7B-1.

7B-12 Pilotage is compulsory and vessels are met $\frac{1}{2}$ mile outside the breakwater.

7B-13 FACILITIES.—Katakolon, population about 850, is the port for Pírgos, 7 miles east-northeastward, to which it is connected by railway. The inner side of the southern breakwater is quayed and has depths of 3 to 12 feet. The quays in front of the town and the inner side of the northern breakwater have depths of 2 to 12 feet.

Two cranes of 2-ton capacity and several lighters are available. There is one water hydrant on the quay; however, water is scarce especially in the summer. A small marine railway and machine shop are located close to the north breakwater.

LANDMARKS—COASTAL FEATURES

7B-14 The coast between Ákra Katákolon and Ákra Tripiti, 16 miles northwestward, recedes 4 miles northeastward to form a bight with low sandy shores backed by a cultivated plain. The western side of the peninsula at Katákolon and the shores of the bight are fronted with rocks and shallow water of less than 6 fathoms depth for a distance of 1 mile in places.

Ákra Tripiti ($37^{\circ}50' N.$, $21^{\circ}06' E.$), the southern end of a headland, 6 miles long, is rocky and is closely fringed with rocks and shallow water. A light is shown on Ákra Tripiti.

Ákra Killini, the northern end of the headland, is a low rocky point fronted by dangers, as is the entire seaface of the headland, for a distance of about $\frac{3}{4}$ mile. A conspicuous castle stands on the summit of a hill, 857 feet high, about $1\frac{1}{2}$ miles inland and midway between Ákra Tripiti and Ákra Killini.

An area of foul ground, about 1 mile square, is close northward of Ákra Killini.

Nísos Kavkalídhá, an islet 18 feet high, is the outermost of several rocks lying close offshore, $\frac{3}{4}$ mile west-southwestward of Ákra Killini. A light is shown from a square masonry tower and dwelling, 49 feet high, on Nísos Kavkalídhá.

The off-lying Mesokanáli Reef is described in section 7B-3.

Limni Killinis, situated $\frac{3}{4}$ mile southeastward of Ákra Killini, is a small port protected to northward by a breakwater, 650 yards long, the outer end of which is partially destroyed and is underwater. A light buoy

showing a flashing green light is moored 60 yards off the sunken head of the breakwater.

A dangerous wreck lies close eastward of the light buoy. Good anchorage can be taken in 5 to 6 fathoms over sand and mud about $\frac{3}{4}$ mile eastward of the head of the breakwater.

From Ákra Killini, the coast trends 20 miles northeastward to Ákra Pápas, described in section 7C-1, receding slightly to form a bight. This stretch of coast with one exception, see below, is low and sandy and is backed by wooded and cultivated land. Near Ákra Pápas, the land rises in dark rounded hills, the highest of which is 817 feet high and is located 3 miles southward of Ákra Pápas.

A depth of 5 fathoms exists about 6 miles northeastward of Ákra Killini, and a depth of 7 fathoms exists about $3\frac{1}{2}$ miles north-northeastward of the 5-fathom depth. A depth of $2\frac{1}{4}$ fathoms also exists about $6\frac{1}{4}$ miles westward of Ákra Killini.

Ákra Koumoupéli, an isolated rocky point, 156 feet high, and on which stands the ruins of a fortress, is situated $13\frac{1}{2}$ miles northeastward of Ákra Killini.

ANCHORAGES ON THE WESTERN SIDE OF PELÓPONNISOS,

NORTHWARD OF AKRA KATAKOLON

7B-15 Limni Katakólou.—Section 7B-10.

Ákra Katákolon to Ákra Tripiti (sec. 7B-14).—Vessels can anchor anywhere in the bight between these two points but northward of the rocky area near the latter in 6 or more fathoms over sand or mud.

NÍSOS ZAKINTHOS (ZANTE)

7B-16 General description.—Nísos Zakynthos, the southernmost of the Ionian Islands, lies with Ákra Yérakas, its southeastern extremity, 16 miles west-northwestward, of Ákra Katákolon. Its southern end is formed by two points of land between which lies Órmos Keríou.

The island is 20 miles long and has a maximum width of 9 miles. The western part of the island is mountainous, the highest summit, 2,724 feet high, is situated in

the northwestern central part. The eastern part of the island is an extensive plain which is wooded and cultivated. The island has traces of volcanic formation and is subject to severe earthquakes.

The western and northern sides of the island are steep-to and without hidden dangers. Its eastern side is fringed with rocks and shallow water for a distance of $\frac{3}{4}$ mile in places. Two islets with bordering dangers are situated at the entrance to Órmos Keríou, one on the eastern side and the other on the western. The head of this bay is shallow.

7B-17 Landmarks — coastal features, southern side.—Ákra Yérakas ($37^{\circ}42' N.$, $20^{\circ}59' E.$), the southeastern extremity of Nisos Zákynthos, is low. Caution is advised in approaching this point during reduced visibility. A mountain, 1,621 feet high and situated $3\frac{3}{4}$ miles northwestward of the cape, may be mistaken for the southeastern extremity of the island.

Órmos Keríou is entered between Ákra Yérakas and Ákra Marathiás, $6\frac{1}{2}$ miles west-southwestward. An islet, 282 feet high, lies 1 mile offshore of the northeastern side of the bay and is fronted northwestward for $\frac{1}{2}$ mile by a reef. A stranded wreck, marked by a light, lies about 840 yards west-northwestward of the western extremity of the islet. Another islet, 488 feet high, lies $1\frac{1}{4}$ miles offshore of the southwestern side of the bay and is joined to the shore northwestward by a ridge of rocks. Clear of these dangers and the shallow water about 1 mile wide in places at the head of the bay, the depths in it are from 7 to 32 fathoms. The bay is seldom used because of its rocky bottom and its lack of protection from southerly and southeasterly winds.

Ákra Kerí, the southern extremity of Nisos Zákynthos, is situated $1\frac{1}{2}$ miles southwestward of Ákra Marathiás. A light is shown from a cylindrical tower on a dwelling, about 1 mile west-northwestward of Ákra Kerí.

The western side trends $15\frac{1}{2}$ miles northwestward from Ákra Kerí, thence 6 miles northeastward to Ákra Skinári. There are several small coves and one closely off-lying islet, but for the most part the shore is regular and steep-to. The highest summit of the island is situated $7\frac{1}{2}$ miles southward of Ákra Skinári.

Ákra Skinári ($37^{\circ}56' N.$, $20^{\circ}42' E.$), the northern extremity of Nisos Zákynthos, is steep-to and has a flat-topped summit, 200 feet high. The point is marked by a light shown from a cylindrical masonry tower and dwelling, the whole 30 feet high.

7B-18 Eastern side.—From Ákra Yérakas, the coast trends 2 miles northward to Ákra Vasilikós, a low tongue of land with a sandy beach on either side of it. From Ákra Vasilikós, the coast trends 3 miles northwestward to Ákra Dhávia, a bluff cape fringed by sunken rocks and the southern entrance point of Órmos Zákynthos.

Órmos Zákynthos, at the head of which is situated the town and harbor of Zákynthos, is entered between Ákra Dhávia and Ákra Krionéri, 3 miles northwestward. Limín Zákynthou is described in section 7B-20.

Ákra Krionéri is a low point fronted by shallow water for a distance of $\frac{1}{4}$ mile. The point is marked by a light. A detached 16-foot patch is reported to exist 1 mile northward of Ákra Krioneri.

The coast from Ákra Krionéri trends 6 miles northwestward to Órmos Alikón, thence for the same distance north-northwestward to Ákra Skinári. An islet lies close off the entrance to a cove, $1\frac{1}{2}$ miles southward of Ákra Skinári.

ANCHORAGES OF NISOS ZAKINTHOS

7B-19 Órmos Keríou (sec. 7B-17).—In 7 fathoms in the western side of the bay between the western islet and the eastern side of Ákra Marathiás.

Ormos Alikon (sec. 7B-18).—In 18.3m (10 fm) to 28m (15 fm) over good holding ground and about 1 mile offshore.

Limín Zakínthou.—Section 7B-25.

LIMÍN ZAKINTHOU (ZANTE HARBOR)

Position: 37°47'N., 20°54'E.

Depths:

Anchorage, 9.1m (5 fm) to 18.3m (10fm)

Harbor entrance, 6.7m (22 ft.)

Quays, 4.5m (15 ft.)

7B-20 Limín Zakínthou is situated at the head of Órmos Zakínthos at the town of Zakínthos, the capitol of the island. The harbor consists of a quayed shore front protected to northeastward and southeastward by breakwaters.

7B-21 Dangers.—Dhimitris Reef with a least depth of 1.8m (6 ft.) lies in the southeastern approach to the harbor, about 1/2 mile southeastward of the head of the northern breakwater. A 1.8m (6 ft.) rocky patch lies about 100 yards southward of the reef.

7B-22 Navigation.—The harbor may be approached from any convenient position on the tracks described in section 7B-4. See, also, *Directions for entering section 7B-28.*

7B-23 Depths.—The depths in the approach are from 10.9m (6 fm) to 18.3m (10 fm). The western part of the harbor for a distance of 450 yards has depths of less than 5.5m (18 ft.), and the eastern part has depths of about 6.1m (20 ft.). At the harbor entrance the controlling depth is 6.7m (22 ft.).

In 1956, it was reported that vessels not exceeding 300 feet in length and 15 feet in draft can be accommodated alongside.

7B-24 Landmarks.—A conspicuous church and nearby chimney stand on the southern bank of the mouth of a river that discharges into the southern part of the bay. Near the root of the southern breakwater is a conspicuous square pointed yellow dome of a monastery. The ruins of a large fortress stand on a hill, 522 feet high, close westward of the town. A signal station is located on the northeastern extremity of the fortress. A radio mast is located about two miles southwestward of the town.

7B-25 Anchorage.—Large vessels usually anchor in 12.8m (7 fm) to 18.3m (10fm) over mud and sand about 1/2 mile northeastward of the head of the northern breakwater. Small vessels can anchor closer to the breakwater in 9.1m (5 fm).

Because of submarine cables, anchoring is prohibited westward of any position about 1/2 mile offshore between Akra Krionéri and a position 1/2 mile north-northeastward of the head of the northern breakwater.

7B-26 Harbor.—From near the northern part of the town, a breakwater, quayed on its inner side, extends 500 yards southeastward. The quayed section is widened to form a short mole, 175 feet long at its head, at a position 480 feet from the head of the breakwater.

A rubble breakwater extends 320 yards northeastward from a position close northward of the river mouth previously mentioned. This breakwater serves principally as a groin to control harbor silting.

The shore of the town is quayed between the roots of the breakwaters but silting has reduced the alongside depths so that there is only 1.8m (6 ft.) at its northern end.

The head of the northern breakwater is marked by a light.

7B-27 Pilotage is compulsory for foreign merchant vessels. The pilots are based at Patrai, but in emergencies local boatmen sometimes act in their stead.

7B-28 Directions for entering.—Vessels approaching from southward should give Akra Vasilikós a wide berth and keep the islet of Vólidhi, situated about 1 mile north-westward of Akra Krionéri, bearing 310° or less and open northeastward of Akra Krionéri. This course should be maintained until the head of the northern breakwater bears 283° or less, at which position the vessel will be safely northward of Dhimitris Reef and course can be shaped for the entrance.

Vessels from northwestward should round Akra Krioneri at a distance of not less than $\frac{1}{2}$ mile.

7B-29 FACILITIES.—Zákinthos, situated at the head of Órmos Zákinthos, is an old Venetian-style town extending in a semicircle along the shore of the bay. In 1962 the population was about 38,000.

A vessel, 300 feet long and drawing not more than 15 feet, can berth alongside the outer part of the northern breakwater. Vessels, drawing up to 18 feet, can moor stern to this part of the breakwater. Cargo is handled by lighters at the anchorage.

Moderate quantities of fresh water and provisions can be obtained. A marine railway for small craft is available.

A radio station is open to public correspondence; there is steamer service between the town and other Greek ports.

There is a small well-equipped hospital.

PART C. PATRAIKÓS KÓLPOS (GULF OF PATRAS)

7C-1 Akra Pápas ($38^{\circ}13' N.$, $21^{\circ}22' E.$), the southern entrance point of Patraikós Kólpos and situated 7 miles northward of Akra Kounoupéli (sec. 7B-14), is the extremity of a low shingle spit that extends $1\frac{1}{4}$ miles northward from the foot of the dark rounded hills, previously described in the foregoing reference, at the northwestern corner of Pelóponnisos. Shallow water with depths of less than 10.9m (6 fm) extends $\frac{3}{4}$ mile northwestward and $\frac{1}{2}$ mile northward from the cape. A ruined tower stands at the base of the 131-foot summit of Akra Várdhia, 1 mile eastward of Akra Pápas.

Akra Pápas Light is situated about 500 yards southeastward of the end of the spit.

The Arazus aviation radiobeacon lies about 8 miles southeastward of Akra Pápas.

GENERAL DESCRIPTION

7C-2 Patraikós Kólpos separates northwestern Pelóponnisos from the mainland northward and is entered between Akra Pápas and Nisos Oxiá, 13 miles west-northwestward. Between Akra Pápas and its eastern extremity at The Narrows leading

into Korinthiakós, the gulf is 20 miles long and has a deep water width of from $4\frac{3}{4}$ to $9\frac{1}{2}$ miles. The fairway depths are from 40m (22 fm) to 136m (74 fm).

The northern shore trends generally eastward, and between the northern entrance point and Akra Khalkís, a distance of $22\frac{1}{2}$ miles, it is low and encloses an extensive lagoon. Though the shores of the gulf are generally low, elsewhere they are backed by high land.

The southern shore recedes $6\frac{1}{2}$ miles, forming a large bight, on the eastern side of which is situated the city and port of Pátrai.

The eastern end of the gulf is connected to Korinthiakós Kólpos by The Narrows, a deep water passage about 1 mile wide.

DANGERS

7C-3 There are no detached or off-lying dangers in the gulf, and vessels can safely approach either side to the 6-fathom curve which is nowhere more than $1\frac{1}{4}$ miles off-shore.

Numerous fishing vessels are encountered in the gulf. These vessels usually work in pairs towing up to $\frac{1}{2}$ mile apart, a single net between them.

NAVIGATION

7C-4 From the terminal position of the coastal track with Akra Pápas Lighthouse bearing 126° , distant 2.5 miles, a course of 078° for 21.5 miles leads to a mid-channel position in The Narrows. This course passes 1 mile southward of the light buoy off Akra Évinos, section 7C-7.

Navigation is prohibited within $1\frac{1}{2}$ miles of the coast from Akra Kounoupéli to Akra Pápas, and from Akra Pápas to a point $4\frac{1}{2}$ miles east-southeastward.

CURRENT AND WIND

7C-5 Current.—The current in the vic-

inity of Akra Pápas is described in section 7B-5.

A counter current sets in opposite direction to that of the wind along the southern side of the gulf. This current sets either toward or from Pátrai depending upon the direction of the wind.

Wind.—In the gulf, the prevailing north-easterly wind blows for nine months of the year, but during summer a fresh northwesterly wind or sea breeze blows occasionally.

LANDMARKS—COASTAL FEATURES

7C-6 Southern side.—The coast between Akra Pápas and Pátrai, 17 miles eastward, forms a bight, the shores of which are mostly low and sandy, with depths decreasing gradually toward them. Several small towns and villages are situated near the coast along this stretch, and a railway follows the southern and eastern sides of this bight.

Akra Várdhia is the high northern extremity of an otherwise low and narrow island, $1\frac{3}{4}$ miles long, situated 1 mile eastward of Akra Pápas. For landmark, see section 7C-1. Pápas, an artificial military harbor with a depth of 9 feet, and formed by a 350-foot breakwater and a 200-foot mole, is situated on the western side of this island.

Pátrai, whose harbor is described in section 7C-17, covers a considerable area and provides an excellent landmark for east-bound vessels.

From Pátrai the coast trends about $11\frac{1}{2}$ miles north-northeastward to Akra Ayiá, on which stands a tower. A light is shown on Akra Ayia. Thence the low-lying coast trends about $2\frac{1}{2}$ miles northeastward to Akra Ríon.

Akra Ríon and Akra Andírríon, the southern and northern limits, respectively, of The Narrows, are described in section 7D-1.

7C-7 Northern side.—Níkos Oxiá, an island 1,871 feet high and $2\frac{1}{2}$ miles long, lies with Akra Oxiá ($38^{\circ}17' N.$, $21^{\circ}06' E.$), its

southern extremity, $2\frac{1}{2}$ miles west-southwestward of Akra Skrófa. The latter point is the southwestern extremity of a long, low island closely off-lying the mainland from which it is separated by the western end of Mesolóngion Lagoon. Níkos Oxiá is steep-to and precipitous and its summit is an excellent landmark. When viewed from a distance, the island appears as two, the northern part being much higher than the southern.

A steep-to shoal with depths of less than $4\frac{1}{2}$ fathoms extends $1\frac{1}{4}$ miles southwestward and southward from Akra Skrófa.

Akra Oxiá Light is shown from a gray cylindrical tower, 25 feet high, situated on the southern extremity of Níkos Oxiá.

A dangerous wreck lies sunk about $2\frac{1}{4}$ miles east-northeastward of Akra Óxia Light.

Óros Koutsiláris, 1,414 feet high and situated 2 miles eastward of the northern end of Níkos Oxiá, is the sole coastal elevation westward of the summit near Akra Khalkís, $21\frac{1}{2}$ miles eastward. Mesolóngion Lagoon is contained between these two elevations.

Mesolóngion Lagoon, a shallow extensive body of water with numerous islets and mudbanks, is only available for boats with local knowledge. It extends from Akra Skrófa to Akra Évinos, $15\frac{1}{2}$ miles eastward. The lagoon is fronted by a chain of low sandy islets between which are numerous shallow inlets. Shoals with depths of less than 6 fathoms extend southward from these islets for a distance of 1 mile in places, and there is indication that the shoals are widening.

Ayios Sóstis, a sandy islet lying $10\frac{1}{2}$ miles eastward of Akra Skrófa, is marked on its southeastern end by a light shown from a white cylindrical masonry tower, 37 feet high.

Akra Évinos, previously mentioned, is a low shingle point. A light buoy is moored at the extremity of the bordering shoal, about $\frac{3}{4}$ mile south-southeastward of the point.

The description of the coast eastward of Akra Évinos is continued in section 7C-15.

LIMIN MESOLONGIOU (MESOLONGION HARBOR)

Position: 38°22' N., 21°25' E.

Depths:

Entrance channel, less than 13 feet.

Harbor basin, 17 feet.

Quays, 12 to 14 feet.

7C-8 Limin Mesolongiou is an artificially constructed basin in Mesolongion Lagoon on the southern end of a peninsula, northward of which lies the town of Mesolongion. The harbor is entered through a dredged channel 2½ miles long which opens from the gulf close westward of Nisos Tourlis, situated 2 miles eastward of Ayios Sóstis. There is a passenger landing pier at Nisos Tourlis which is connected to Mesolongion by a causeway.

7C-9 Navigation.—The following courses from the positions indicated will lead to a position 1 mile southward of the entrance buoys of the dredged channel to Limin Mesolongion.

Eastbound, from the terminal position of the coastal track with Akra Pápas Light-house bearing 126°, distant 2.5 miles: 048° for 5.3 miles.

Westbound, from a mid-channel position in The Narrows: 258° for 13.8 miles to a position 1 mile southward of the light buoy off Akra Evinos; thence 298° for 4 miles.

7C-10 Depths.—The least depth in the dredged channel and in the approach thereto was reported (1965) to be 11 1/2 feet. The dredged channel is subject to silting.

Anchorage for large vessels is just southwestward of the entrance in depths of 6 to 7 fathoms, mud and sand bottom.

7C-11 The entrance channel has a width of about 180 feet. It is marked by four pairs of light beacons. Two light buoys mark the entrance to the channel in a position ¼ mile southward of the western end of Nisos Tourlis, the eastern buoy showing a flashing green light and the western one a flashing red light.

The customhouse and health office are located near the pier on Nisos Tourlis.

7C-12 The harbor is a quadrangular basin with a clear diameter of about 1,000 feet. There are five wooden quays on the eastern side, all of which are in a poor state of repair.

The entrance points of the basin are normally marked by lights.

7C-13 Pilotage is optional. An unlicensed pilot is available and will meet vessels off the entrance buoys.

7C-14 FACILITIES.—Mesolongion, population about 10,000, stands on a low swampy peninsula in Mesolongion Lagoon. The quays have an alongside depth of 12 to 14 feet. The quay fronting the salt factory is of reinforced concrete and is used exclusively for loading salt. Minor repairs to engine parts can be accomplished. The town has railway and telephone facilities and is connected by motor road to other towns in northwestern Greece. There is a small hospital of 40 beds and two private nursing clinics.

LANDMARKS—COASTAL FEATURES (Continued)

7C-15 Northern side, continued.—From Akra Evinos, a low sandy shore trends 6 miles northeastward to Krionéri, situated at the foot of Óros Varasovon, a rocky mountain 2,998 feet high. Akra Khalkís, a steep cape, forms the southeastern base of Óros Varasovon in a position 1¼ miles eastward of Krionéri.

Órmos Kalidhónos, which indents the coast to a distance of ½ mile, is entered close westward of Akra Khalkís. The small harbor and town of Krionéri is situated at the head of the bay. A buoyed channel, which, in 1946, was dredged to a depth of 16 feet, leads to a small pier in the harbor, alongside which there was a depth of 16 feet in the same year. The town has railway and telephone facilities; coastal steamers call regularly.

From Akra Khalkís, the coast trends 7 miles eastward to Akra Andírrion and contains several indentations. For description of Akra Andírrion, see section 7D-1.

ANCHORAGES

7C-16 Akra Skrofa (sec. 7C-7).—In 12.8m (7 fm) to 21.9m (12 fm) about 2 1/2 miles east-southeastward of the cape.

Ayios Sostis (sec. 7C-7).—In 10.9m (6 fm) to 13m (7 fm) over sand and mud about 1 1/2 miles southwestward of the islet. The depths here shoal abruptly shoreward.

Nisos Tourlis (Limn Mesolonglou) (sec. 7C-8).—In 8.3m (4 1/2 fm) about 3/4 mile south-southwestward of the landing pier at the islet, and close off the western entrance light buoy. Large vessels can anchor farther south-southwestward.

Limn Patrón.—Section 7C-22.

Southern side of gulf (sec. 7C-6).—The principal anchorage is off Limn Patrón, but vessels can anchor anywhere off the southern coast.

Caution.—Vessels approaching any anchorage on the northern side of the gulf should sound frequently because there are indications that the shoals fronting the coast are gradually extending southward.

LIMN PATRÓN (PÁTRAI HARBOR)

Position: 38°15'N., 21°44'E.

Depths:

Anchorage, 21.9m (12 fm) to 37m (20 fm).

Harbor, 7.3m (24 ft.) to 10.9m (36 ft.).

Quays, 0.6m (2 ft.) to 9.1m (30 ft.).

Tide: Mean range, 1.5 feet.

Port plan: Section 7C-25.

7C-17 Limn Patrón, the harbor of Pátrai, is situated on the southeastern shore of Patraikós Kólpos, 17 miles eastward of Akra Pápas. The city of Pátrai is built south-eastward of the harbor on slightly elevated ground. The harbor consists of two principal moles with intervening quays, the whole protected by a detached breakwater. The harbor serves also as a Greek Naval Base.

NAVIGATION

7C-18 The following courses lead from the positions indicated to a position 0.5 mile northwestward of the northern head of the breakwater at Limn Patrón.

Eastbound, from the terminal position on

the coastal track with Akra Pápas Light-house bearing 126°, distant 2.5 miles: 086° for 21.5 miles.

Westbound, from a midchannel position in The Narrows: 218° for 2.6 miles to a position with the tower on Akra Ayiá bearing 112°, distant 0.5 mile; thence 202° for 1.6 mile.

CURRENT AND WIND

7C-19 Current.—During strong north-easterly wind a current may occasionally set strongly to windward at Pátrai. A weak tidal current, the velocity of which does not exceed 1/2 knot, is also experienced, the ebb setting about southwestward and the flood about northeastward.

Wind.—Easterly winds, ranging from northeast to southeast, prevail during winter, attaining gale force occasionally. From April to June, light easterly winds prevail, and from June until October the prevailing wind is westerly. From April to October the wind seldom attains sufficient velocity to interfere with cargo handling by vessels at anchor or alongside berths.

DEPTHS

7C-20 The depths in the anchorage and in the approach to the harbor vary from 21.9m (12 fm) to 37m (20 fm). In the fairway of the harbor there is a depth of from 7.3m (24 ft) to 10.9m (36 ft.). There are depths of 0.6m (2 ft.) to 8.5m (28 ft.) alongside the quays. Overseas quay located about 220 yards northeastward of Astingos Mole has depths of 10m (33 ft.) alongside.

LANDMARKS

7C-21 The city of Pátrai itself is the most conspicuous landmark from afar, it occupying a relatively large area on sloping ground at the foot of a range of mountains which rise to their highest summit at Óros Panakhaikón, 6,340 feet high, about 9 miles east-southeastward of the harbor. At night, the illumination of the city serves equally well. Most conspicuous in the city are: a castle atop a hill, 337 feet high, overlooking

the city to eastward; two white square towers on a church standing apart from other buildings $\frac{1}{2}$ mile east-southeastward of *Áyios Andréas Mole*; and another church with three domes situated 300 yards farther eastward. A very high and conspicuous chimney, about $\frac{5}{8}$ mile north-northeastward of *Astingos mole*, is an excellent mark when approaching the port.

ANCHORAGE

7C-22 Large vessels usually anchor outside the breakwater in 21.9m (12 fm) to 29m (16 fm) over mud and sand. Good anchorage, sheltered from easterly winds, is found southward of the harbor inshore of the 20-fathom curve. The holding ground inside the harbor is poor. Vessels frequently moor with their sterns secured to either end of the breakwater.

A small foul area is located about 1,200 yards, west-southwestward of the southern head of the detached breakwater.

A mooring buoy is moored about $\frac{1}{4}$ mile northeastward of the northern head of the breakwater.

Anchoring is prohibited, because of submarine cables, northward of a line drawn 240° from a white cable house on the shore about $\frac{1}{2}$ mile north-northeastward of the northern head of the breakwater.

HARBOR

7C-23 *Limín Patrón* consists of two principal moles extending northwestward from a quayed shore front. A detached break-

water, $\frac{1}{2}$ mile long and quayed on its inner side, protects the harbor to northwestward. Construction work is in progress (1967) to extend the breakwater northward. A red buoy marks the advance of work in progress. *Astingos Mole*, 420 feet long and also known as *Flour Mill Jetty*, lies eastward of the northern head of the detached breakwater. The southern side of this mole is partially used because of damage. The area northward of *Astingos Mole* was reported (1963) to have been dredged to 10m (33ft.) for about 400 yards, fronting a new quay. *Áyios Nikolaos Mole*, the central and largest mole, extends 840 feet northwestward from a position southwestward of the former two and near the Health Office. Rocks extend about 10 feet from this mole, as a result vessels usually use the Mediterranean moor in tying-up to this mole. *Kalávríta Mole*, about $\frac{1}{4}$ mile farther southwestward, has a total length of 530 feet but the western side is not suitable for the berthing of vessels. *Áyios Andréas Mole*, southwestward of *Kalavrita Mole*, has a breakwater extending nearly 400 feet north-northeastward from its head. *Áyios Andréas Mole*, used by lighters, forms the southern limit of the harbor.

The deep-water channel of the southern entrance is about 200 feet wide and that of the northern is about 550 feet wide.

The head of Astingos and Kalávrita Moles and the extremities of the detached breakwater are each marked by a light. A light-house (unlighted) stands at the head of Áyios Nikólaos Mole.

PILOTAGE

7C-24 Pilotage is compulsory. Pilots are competent and meet vessels about 1 mile outside the breakwater and, if necessary, will take vessels in at night.

FACILITIES

7C-25 Patrai, the fourth largest city in Greece and an important commercial and industrial center, stands on slightly elevated ground southeastward and southward of the harbor. The city is well laid out with broad straight streets. The population was about 90,000 in 1962.

The United States is represented by a consul.

Berths.—The particulars of the berths, which are numbered only for reference to the port plan, are as follows:

Berth	Usable length (feet)	Depth
1	420	8.5m (28 ft.)
2	395	4.5m (15 ft.) to 5.5m 18ft.)
3	440	2.4m (8 ft.) to 6.4m (21 ft.)
4	125	2.4m (8 ft.) to 6.4m (21 ft.)
*5	840	1.2m (4 ft.) to 3m (10ft.)
*6	760	1.2m (4 ft.) to 3m (10 ft.)
7	135	7.9m (26ft.) to 9.1m (30 ft.)
8	1035	7.9m (26ft.) to 9.1m (30 ft.)
9	420	8.8m (29 ft.)
10	440	9.1m (30 ft.)

*5.5m (18 ft.) to 7.3m (24 ft.) of water 15 to 30 feet from the mole. Vessels normally moor stern-to.

Four automotive cranes with capacities of 3 to 8 tons are available.

than 100 fathoms except in the western entrance and in the approach to the canal.

Marathia Reef with a depth of 4.5m (15 ft.) lies 1/2 mile off the northern shore in a position 12 miles east-northeastward of Akra Andirion.

The dangers in the lesser gulfs are described with their respective gulfs.

NAVIGATION

7D-4 Eastbound.—The following courses from a mid-channel position in The Narrows will lead to a position 1 mile northwestward of the entrance to Dhiórix Korinthou: 058° for 4.3 miles to a position 1 mile northward of Akra Dhrépanon Lighthouse; thence 101° for 16.2 miles to a position 1 mile southward of Akra Psaromita Lighthouse; thence 120° for 41.3 miles. With the exception of The Narrows, this track closes land, the southern shore, to a minimum distance of 1 mile and in a minimum depth of 73m (40 fm).

TIDE, CURRENT, AND WIND

7D-5 Tide.—The tidal action in the gulf, although small, is regular and clearly marked, the range at spring tides being slightly over 2 feet.

Current.—In The Narrows, the tidal current turns at the time of high and low water at Nisos Trizónia, an island lying off the northern shore in a position 14 miles eastward of Akra Andirion. At spring tides this current attains a velocity of 2 knots, but its direction and velocity are influenced by prevailing and strong winds. At such times the ebb current, flowing out of the gulf, may attain a velocity of 3½ knots in the middle of The Narrows and 5½ knots close inshore, thereby affecting navigation. The tidal current decreases as the gulf widens eastward and soon ceases altogether. In the middle of the gulf a slight drift is frequently produced by prevailing wind.

Wind.—The northwesterly wind blowing during the summer raises a considerable sea in the eastern part of the gulf, but at night

it is usually calm. In the western part of the gulf a northeasterly wind prevails, which usually increases in force as the entrance to the gulf is approached. In Krissaífos Kólpos and Andískiron Kólpos, it is usually calm during the summer, although a fresh breeze may be blowing in the middle of the gulf.

LANDMARKS—COASTAL FEATURES

7D-6 Western end of Korinthiakós Kólpos.—The southern shore of the western end of the gulf, which is low, trends 3½ miles northeastward from Akra Ríon to Akra Dhrépanon, a low sandy point, fronted for 550 yards northwestward by a sandy spit that terminates with a rock almost awash. The point is marked by a light.

The northern shore of the western end of the gulf between Akra Andirion and Akra Mórnos, 5¾ miles east-northeastward, recedes northward, forming a bay, at the head of which is situated Návpaktos, a town and port of call for coasters. The boat harbor is marked by a light. Akra Mórnos is the southern extremity of a low, marshy river delta, and is marked by a light.

7D-7 The southern shore is well populated with numerous villages and towns, the most important being Aíyion. The shore trends fairly regularly east-southeastward from Akra Dhrépanon to Órmos Korinthou at the southeastern end of the gulf. The coast is backed by high mountains, some of which rise close to the shore. Óros Killíni, 7,800 feet high and the highest along the coast rises 12 miles inland and 35 miles east-southeastward of Akra Dhrépanon. A railway follows the coastline close inland.

Several points of land project a short distance from the southern shore; all of them are low and sandy and with one exception are river deltas.

A light is shown on Akra Likoporia, a point of land about halfway between Aiyon and Ormos Korinthou.

A light is shown on the end of the jetty at Kiatou, about 5 miles west-southwest of Akra Melangari.

ORMOS AIYIOU

Position: 38°15' N., 22°05' E.

Depths:

Anchorage, 28m (15 fm).

Head of mole, 3.9m (13 ft.).

7D-8 Órmos Aiyiou indents the southern shore of the gulf for about 1 mile between Ákra Yíftissa, 13 miles east-southeastward of Ákra Dhrépanon, and Ákra Rodhodháfni, about 2 miles west-northwestward. Both entrance points are low. The town of Aíyion is situated at the head of the bay and its shore is fronted by stone quays, several wooden piers, and a stone mole about 300 feet long, the head of which is marked by a light.

7D-9 Depths.—The bay has depths of from 18.3m (10 fm) to 183m (100 fm) and the 6-fathom curve lies nowhere beyond 200 yards offshore. The depths in the usual anchorage are from 24m (13 fm) to 28m (15 fm). There is a depth of 3.9m (13 ft.) at the head of the mole, close eastward and westward of which are depths of 10.9m (6 fm) or more.

7D-10 Landmarks.—Besides the prominence of the town which is built on a flat steep-sided hill, 50 feet high, the paper mill with chimney on the inner western side of the bay are conspicuous.

7D-11 Anchorage.—Vessels anchor in 28m (15 fm) over mud about 400 yards northward of the mole head. Small vessels anchor westward of the mole, securing their sterns to it.

7D-12 Pilotage is compulsory; pilots come from Pátrai and meet vessels about ½ mile from the anchorage. In emergency, local boatmen are employed.

7D-13 Directions for entering.—From any position on the track westward of Ákra Psaromíta, a vessel can stand in with the mole at Aíyon bearing 180°.

7D-14 FACILITIES.—Aíyion, population about 20,000, has several industries including currant and olive drying plants and a paper mill. The mole which extends from the center of the town is about 400 feet long with a depth of about 3.9m (13 ft.) at its head. A number of lighters are available for cargo handling. A limited supply of provisions is available. There is a customhouse, and telegraph and telephone service. Aíyion has railway connection to Partai and is a

port of call for coasters. There is a 100-bed well-equipped hospital.

LANDMARKS—COASTAL FEATURES
(Continued)

7D-15 The northern shore between Ákra Mórnos (sec. 7D-6) and Ákra Psaromíta, 15 miles east-southeastward, recedes northward about 2 miles to form a bight with irregular shores. The coast eastward of the river delta at Ákra Mórnos is high with the exception of Ákra Marathía, a low wooded point 6 miles north-northeastward of Ákra Mornos. Marathía Reef with a depth of 4.5m (15 ft.) lies ¾ mile southeastward of Ákra Marathía.

In the eastern part of the bight, mentioned above, are two islets and Níisos Trizónia, an island, 351 feet high and 1¾ miles long, which lies about ⅓ mile offshore. From a distance this island blends into the high land northward but can be recognized by reddish cliffs on its southern and western sides. A light is shown from a point on its northeastern side. Foul ground lies ¼ mile east-northeastward of the light. A submarine pipeline and a submarine cable, about 1 mile apart, extend northward and northeastward to the mainland from the northeastern side of the island. Anchoring and fishing is prohibited within 200 yards of the pipeline and the cable.

Ákra Psaromíta (38°19' N., 22°11' E.) is the termination of a mountainous ridge which descends in three gradual slopes to the gulf. The cape is about 450 feet high, whence northward it rises to from 2,000 to 3,000 feet. The cape is steep-to and is marked by a light.

Between Ákra Psaromita and Ákra Andromákhi, the southern extremity of a bold rounded headland, 350 feet high, 9 miles eastward, the coast is indented by two bays each having two coves at its head. This stretch of shore is steep-to. The village and small vessel anchorage of Eratini is located at the head of the westernmost cove.

Ákra Mákri Nikólaos, the southwestern extremity of the mountainous Pássalos peninsula, situated 8¾ miles east-southeastward of Ákra Andhromákhi, forms with the latter

point the entrance to Krissaíos Kólpos (sec. 7D-16). Ákra Mákri Nikólaos rises steeply to a height of 508 feet, is steep-to, and is marked by a light.

Ákra Pángalos, the southeastern extremity of the Pássalos peninsula, is the western entrance point of Andíkiroń Kólpos (sec. 7D-21).

Óros Parnassós, 8,040 feet high, is situated 15 miles northward of the extremity of the Pássalos peninsula.

Ákra Velanídhia, situated 9 miles east-southeastward of Ákra Pángalos, is the eastern entrance point of Andíkiroń Kólpos and the northern entrance point of Kólpos Alki-onídhon (sec. 7D-24).

Ákra Melangávi, situated 13 miles south-southeastward of Ákra Velanídhia, is the narrow extremity of a mountainous peninsula that separates Kólpos Alki-onídhon from Órmos Korínthou (sec. 7D-25). The cape is marked by a light.

KRISSAÍOS KÓLPOS

7D-16 General description. — Krissaíos Kólpos indents the middle part of the northern shore of Korinthiakós Kólpos to a distance of about 7 miles and is the larger of the two gulfs along this shore. Its entrance between Ákra Andromákhi, marked by a light, and Ákra Mákri Nikólaos (sec. 7D-15) is 9 miles wide and its sides converge gradually toward Limin Itas, an indentation at the head of the gulf. The western shore of the gulf is irregular and there are several islets and dangers lying off this side. Its eastern side, with the exception of Órmos Sikias, is unindented, steep to, and without off-lying dangers. Krissaíos Kólpos is surrounded on all sides by mountainous terrain, the highest peak being Oros Parnassos described in section 7D-15.

7D-17 Western side.—Órmos Anemokámbl (38°21' N., 22°23' E.) is a deep water cove entered between Ákra Trákhilos, the northeastern extremity of the headland at

Ákra Andromákhi, section 7D-15, and Ákra Poúnda, $\frac{3}{4}$ mile north-northeastward. An isolated rocky patch with a depth of 2.7m (9 ft.) lies 800 yards eastward of Ákra Trákhilos.

Órmos Galaxidhíou is separated from Órmos Anemokámbl by a peninsula, the northern end of which is Ákra Kendri, $1\frac{1}{4}$ miles northward of Ákra Poúnda. The bay is entered between Ákra Kendri and Ákra Tripití, 2 miles north-northeastward; the town and harbor of Galaxidhion is situated on the bay's southwestern shore.

The southeastern approaches to the bay are encumbered by islets, rocks, and reefs for a distance of $1\frac{3}{4}$ miles northeastward of Ákra Kendri. Nisis Apsifía, 28 feet high and marked by a light, lies $\frac{1}{2}$ mile eastward of Ákra Kendri. The northern approach is similarly encumbered for a distance of 1,200 yards northeastward and 700 yards south-eastward of Ákra Tripití. There are several relatively deep but constricted passages through these dangers but their navigation should not be attempted by deep-draft vessels without local knowledge.

Limín Galaxidhíou (38°23' N., 22°23' E.) consists of the roadstead in the middle of Órmos Galaxidhíou and northward of the town of Galaxidhion, which stands partly on a promontory. There are several piers fronting the town available usually only to sailing vessels; one pier is marked by a light. The roadstead, clear of the western shore's closely fringing shoal and the dangers mentioned above, has depths of from 9.1m (5 fm) to 39m (21 fm). The depths close in front of the town are uneven.

The usual anchorage for large vessels has a depth of from 14.6m (8 fm) to 26m (14 fm) over mud or sand between a position 1,600 yards north-northwestward and a position 1,800 yards northward of the light structure at Galaxidhion.

Directions for entering.—Vessels approaching from southwestward should round

Ákra Andromákhi, which is steep-to, at a convenient distance, but, to avoid the rocky patch 800 yards eastward of **Ákra Trákhilos**, should not permit **Ákra Andromákhi**, to bear less than 248° . When **Áyios Dhímítrios**, 27 feet high and the outermost of the islets fronting **Ákra Kendri**, bears 016° and in range with the western extremity of the spur of the mountain on the eastern side of the river valley at **Itea**, $3\frac{1}{2}$ miles farther northward, the vessel is clear to eastward of the previously mentioned rocky patch; thence a vessel should round **Áyios Dhímítrios** on its eastern and northern sides at a distance of $\frac{1}{2}$ mile and steer westward to pass midway between it and **Ákra Tripiti** which lies northward. When the northernmost of the islets fronting **Ákra Kendri** bears 180° , the vessel may steer southwestward to the anchorage.

A vessel approaching from southeastward should favor **Ákra Mákri Nikólaos** and the coast northward, both of which are steep-to, until in the vicinity to eastward of **Áyios Dhímítrios**, and thence follow directions given above.

7D-18 Limín Itéas ($38^{\circ}26' N.$, $22^{\circ}25' E.$), occupying the head of **Krissaios Kólpos**, is entered between **Ákra Tripiti** and **Ákra Itéa**, a low point at the mouth of a fertile valley, 1 mile northeastward. The town of **Itéa**, fronted by a sea wall, is built on the low shore of the valley between **Ákra Itéa** and **Ákra Kamiotisa**, nearly 1 mile northwestward. A pier, about 500 feet long, extends south-southwestward from the center of town and is marked by a light. Foul ground extends in a north-northeasterly direction to the shore from a position about $\frac{2}{3}$ mile south-southeastward of the pier.

The natural harbor of **Itea** is the area at the head of **Krissaios Kólpos**. It is entered between **Ákra Kamiotisa** and **Ákra Marathia**, about $\frac{1}{2}$ mile westward. The harbor has depths of 9.1m (5 fm) to 21.9m (12 fm) and is about $\frac{3}{4}$ mile indiameter. The southwestern side of the harbor is indented by **Ormos Marathia**, and the northern shore is indented by two coves which are separated by a promontory. The western cove, the larger of the two, has depths of 7.3m (4 fm) to 10.9m (6 fm); the eastern cove is shallow. A small pier pro-

jects from the promontory separating the coves. Several mooring buoys are off the end of the pier. Two piers are located on the eastern side of the harbor about $\frac{1}{2}$ mile northward of **Ákra Kamiotisa**. A buoy lies southeastward of the southernmost of the two piers.

A submerged wreck lies about 500 yards west-southwestward of the head of the pier in front of the town; it is marked by a buoy.

Anchorage can be taken anywhere convenient but there are two recommended berths; one, in 18.3m (10 fm) over mud 500 yards southwestward of the pier at **Itea**, and the other in 16.5m (9 fm) over mud 700 yards northwestward of **Ákra Kamiotisa**.

Caution.—In winter during northeasterly and northwesterly gales, the wind blows down the valleys northward of the town with great force raising a considerable short sea which is troublesome for lighterage.

Directions for entering.—The description of the dangers lying in the approach to **Órmos Galaxidhiou** and the directions for entering that bay, sec. 7D-17, should be consulted. To enter **Limín Itéas**, a vessel should approach with the conspicuous church dome in **Itéa** bearing 329° , and when **Áyios Dhímítrios** bears 196° , a course of 299° leads to the first of the anchorage berths described above.

7D-19 Facilities.—**Itéa**, population 2,000, derives its importance chiefly as the port for **Amfissa**, $7\frac{1}{2}$ miles northwestward, to which it is connected by road. The chief export is olives; some bauxite is also exported.

The pier in front of the town has a depth of about 5.8m (19 ft.) at its head and on its western side for about 300 feet from the head. The eastern side is shallow. The quay in front of the town is suitable for lighters and small craft only. There is no cargo-handling gear available. The southernmost of the two piers which lie about $\frac{1}{2}$ mile northward of **Ákra Kamiotisa** is about 700 feet long. The pier is solid fill for the first 650 feet with shallow depths alongside; the outer 60-foot section, which is on pilings, has a depth of 7.3m (24 ft.) at its head. The pier is used for the loading

of ore. The northern pier is about 300 feet long with shallow depths alongside. The pier at the extremity of the promontory between the coves is also used for loading ore.

Water, suitable for boilers, is available from a hydrant on the head of the pier in front of the town. Several lighters are available. A small hospital is located in **Itea** and another in **Amfissa**.

7D-20 Eastern side.—From the eastern

side of the valley at Itia, the coast, which is high, steep-to, and devoid of maritime facilities, trends 10 miles south-southeastward to Akra Makri Nikolaos, which is described in section 7D-15. Ormos Sikias, 3 miles northward of Akra Makri Nikolaos, a small deep water bay, is this coast's only indentation.

ANDIKIRON KOLPOS

7D-21 GENERAL DESCRIPTION.—Andikiron Kolpos is separated from Krissaios Kolpos by mountainous Passalos peninsula and indents the northern shore of Korinthiakos Kolpos for a distance of about 7 miles. This lesser gulf is entered between Akra Pangalos and Akra Velanidhia, 9 miles east-southeastward, both of which are described in section 7D-15. The shores are high, moderately indented, and for the most part steep-to. Several islets are disposed near the entrance of the gulf; the only offshore detached reef, least depth of 9.1m (5 fm), lies on its western side and about 1 1/4 miles offshore. A conspicuous hilly promontory projects from the northwestern side to the gulf, northward of which is located Aspra Spitia, the only village with any shipping facilities in the gulf. The depths in Andikiron Kolpos decrease uniformly and gradually from 183m (100 fm) at its entrance to 10 fathom curve which nowhere lies farther than 1/2 mile offshore.

7D-22 Western Side.—Between Akra Pangalos (38°17'N., 22°35'E.) and Akra Trakhilos, 2 1/2 miles north-northeastward, the coast is indented by several coves. Akra Trakhilos is a narrow projection, 75 feet high, and forms with the promontory of Oros Kefali, 3 miles northeastward, the entrance points of a bay. Trakhilos Ifalos, a rocky patch with a depth of 9.1m (5 fm), lies in the middle of the entrance of this bay. The promontory of Oros Kefali, its summit 1,136 feet high, projects 1 1/4 miles southeastward; a light marks its eastern extremity. A low neck of land forms the root of the promontory.

The village of Aspra Spitia (Andikira) is situated on the shores of a cove close northward of Oros Kefali; it is a port of shipment for the area and is a port of call for coasters. The village has a customhouse, telephone

service, and a motor road connection with nearby towns.

PILOTAGE is compulsory for inbound vessels. Pilots board off Tsaroukhi Island (38°19'N., 22°38'E.) during daylight only.

Three offshore pipeline berths are north of Oros Kefali. The maximum size vessels that can be accommodated is 600 feet in length and 34 foot draft. A tug is available for berthing.

A quay, about 800 feet long, is located 2 miles east-southeastward of Aspra Spitia. A pipeline extends from the shore, close southward of the quay, about 1 1/2 mile southward thence about 5 miles southward. Two **LIGHT** buoys mark the western extremities of the pipeline. Two **LIGHTS**, in range 058°, are located close southward of the quay. Anchorage is prohibited within 1 1/2 miles of the pipeline.

An aluminum loading-terminal consisting of a concrete quay, 869 feet long, with a depth of 9.1m (30 ft.) alongside, and conspicuous cranes, is located about 1/2 mile northward of Akra Ayios Theodoroi.

The head of the gulf lies between Oros Kefali and Akra Mounda, about 2 miles southeastward, wherein, and particularly off Aspra Spitia, sheltered **ANCHORAGE** can be taken in from 18.3m (10 fm) to 37m (20 fm).

7D-23 EASTERN SIDE.—From Akra Mounda, a cape 223 feet high that projects nearly 1/2 mile westward from near the head of the gulf, the coast trends uniformly 5 miles southeastward to Akra Mavros, a slight projection. Ormos Zalitsa is formed between Akra Mavros and Akra Velanidhia, 2 3/4 miles southward. This bay has depths of from 26m (14 fm) to over 183m (100 fm) and is free of dangers except for a reef that extends 800 yards southward from its northern side.

Three islets, previously mentioned, are disposed in a line between Akra Mavros and Akra Trakhilos.

KOLPOS ALKIONIDHON

7D-24 GENERAL DESCRIPTION.—The eastern part of Korinthiakos Kolpos is divided into two bodies of water by a broad mountainous peninsula that projects about 7 1/2 miles westward from the northern part of the isthmus between Peloponnisos and northern Greece.

Kolpos Alkionidhon, the northern and larger body of water, is entered between Akra Velanidhia (38°15'N., 22°46'E.) and Akra Melangavi, the western extremity of this peninsula, situated 13 miles south-southeastward. Both these points are described in section 7D-15.

The gulf is over 15 miles long and has an average width of about 6 miles. Several islets lie off its northern side. There are five principal spacious and sheltered bays on its northern and eastern sides, but because the depths throughout are too great for secure anchorage, the gulf is unimportant to shipping and its shores are sparsely populated. For this reason, only a general description will be given.

NISIDHES ALKIONIDHES, a group of four islets, the largest of which is 394 feet high, lie near the middle of the gulf in a position 8 miles northeastward of Akra Melangavi. Navigation within 200 yards of these islets is prohibited.

ORMOS KORINTHOU

7D-25 GENERAL DESCRIPTION.—Ormos Korinthou, the southeastern arm of Korinthiakos Kolpos, is entered between Akra Melangavi (38°02'N., 22°51'E.), described in section 7D-15, and a point about 4 miles southwestward. The bay recedes about 7 miles southeastward, where at its head is situated the western entrance of Dhiorix Korinthou (corinth Canal) which connects Korinthiakos Kolpos. In common with the other gulfs and bays of the area, the depths in Ormos Korinthou are great; the depths decrease gradually from about 200 fathoms at its entrance to the 20 fathom curve, which nowhere is more than 3/4 mile offshore. There are no off-lying dangers.

NORTHERN SIDE.—From Akra Melangavi the shore trends unindented 6 3/4 miles southeastward to Loutraki, a conspicuous resort village. A LIGHT is shown at Loutraki. This shore is backed by high mountains which rise to their highest summit of 4,432 feet in a position 13 miles eastward of the cape.

The SOUTHERN SIDE is low and cultivated, but rises a short distance inland to the mountains of Peloponnisos.

KORINTHOS, a town of 10,000 population,

is situated 3 miles southwestward of Loutraki. A 450-foot mole extends northeastward from the town, providing protection for a small craft quay. A LIGHT is shown on the mole-head. A LIGHT is shown on the head of a small pier about 400 yards southeastward of the root of the mole. Vessels can anchor in about 26m (14 fm) 600 yards northeastward of the mole head. A light is shown at Korinthos.

DHIORIX KORINTHOU (CORINTH CANAL)

7D-26 GENERAL DESCRIPTION.—Dhiorix Korinthou is a cut of about 3 miles length in a northwest-southeast direction through the narrowest part of the isthmus between Peloponnisos and the mainland. The sides of the canal at either end are formed by the sloping contour of the land but the central two-thirds of its length passes through a deep cutting in the land, the highest part of which is 250 feet high.

The canal is entered from northwestward through a passage 80 yards wide between two curved breakwaters, at a position 1 1/2 miles northeastward of Korinthos (sec. 7D-25). From southeastward it is entered at the town of Isthmia, between a curved northern breakwater and the shore close westward, situated at the head of Ormos Kalamaki.

Transit of the canal is permitted day and night except on Sunday from 0600 to 2000. GMT when it is closed for maintenance.

The canal provides direct access between Korinthiakos Kolpos and Saronikos Kolpos (Gulf of Athens). Vessels bound from southern Italian and Adriatic ports to ports in the eastern part of Greece and in the Aegean Sea will save considerable distance by use of the canal. For example, a vessel bound from Brindisi to Piraeus would save about 130 miles by using the canal rather than rounding Akra Tainaron, the southern extremity of Peloponnisos.

7D-27 Depths and dimensions.—Passage through the canal is limited to vessels (1963) with a maximum draft of 23 feet (7m), beam of 59 feet (18m) and masthead height of 171 feet (52m).

The depth of the canal over a bottom width of not less than 69 feet is maintained at 8m (26 1/4 ft.), but frequent earth falls decrease this depth until dredging has taken place.

7D-28 Notice of arrival.—The Canal Authority desires notice of intention to transit the canal. The message should include: vessel's name, nationality, dimensions and net tonnage, time of arrival, direction of transit, and whether a pilot or tug is required.

Naval vessels and vessels carrying mail have priority of towage, provided that the interval between their arrival and that of a cargo vessel does not exceed one hour.

7D-29 Lights are shown from the following positions: the head of each breakwater; at the northwestern entrance; two lights, one shown on the head of the breakwater and the other on the quay on the shore, mark the southeastern entrance of the canal; and at intervals of about 200 yards on each side of the canal throughout its length.

7D-30 Submarine cables are landed close northward of the canal's northwestern entrance. Anchoring is forbidden in this area.

7D-31 Wind and current.—The prevailing wind in the canal is northwesterly, but easterly and northerly winds are not absent. The normal current sets to the southeast at a velocity seldom exceeding 2.5 knots, but is influenced greatly by wind, especially after its long duration.

7D-32 Pilotage and tugs.—Pilotage is compulsory for vessels being towed; for other vessels it is optional. Pilots assume no responsibility for handling, but place their experience and knowledge of the canal at the disposal of shipmasters. The signal for a pilot is two short blasts on the whistle.

Towage is compulsory for vessels over 800 tons. The signal for a tug is four short blasts on the whistle.

7D-33 Signals.—The following signals, which are displayed from a mast at either end of the canal, indicate the direction of the current and whether entry is permitted or prohibited:

Day	Night	Morning
Blue flag	One white light	Entry permitted
Red flag	Two white lights disposed vertically	Entry prohibited
Two triangular white flags	One red light over one white light	Current with entering vessel
One triangular white flag	Two red lights disposed vertically	Current against entering vessel

If neither current signal is displayed, current is absent.

Directions.—The best time to pass through the canal is when the vessel is stemming the current. With northerly winds, special care is required when entering the northwestern end of the canal. Special care is also required to stay in the deepest part of the canal at either end, where the width at the surface is much greater than at the bottom.

The speed of vessels should not exceed 3 knots when entering the canal nor 6 knots during transit.

Vessels waiting to enter should keep at least 400 yards from either entrance to the canal.

ANCHORAGES

7D-34 Navpaktos (sec. 7D-6).—In 13m (7 fm) to 24m (13 fm) from 1/4 to 1/2 miles off the town.

Órmos Afylou.—Section 7D-11.

Limín Galaxidhiou.—Section 7D-17.

Aspra Spítia.—Section 7D-22.

Korinthos.—Section 7D-25.

Loutraki (sec. 7D-25).—In from 16.5m (9 fm) to 33m (18 fm), from 600 to 800 yards off the village. See location of prohibited anchorage mentioned in section 7D-30.

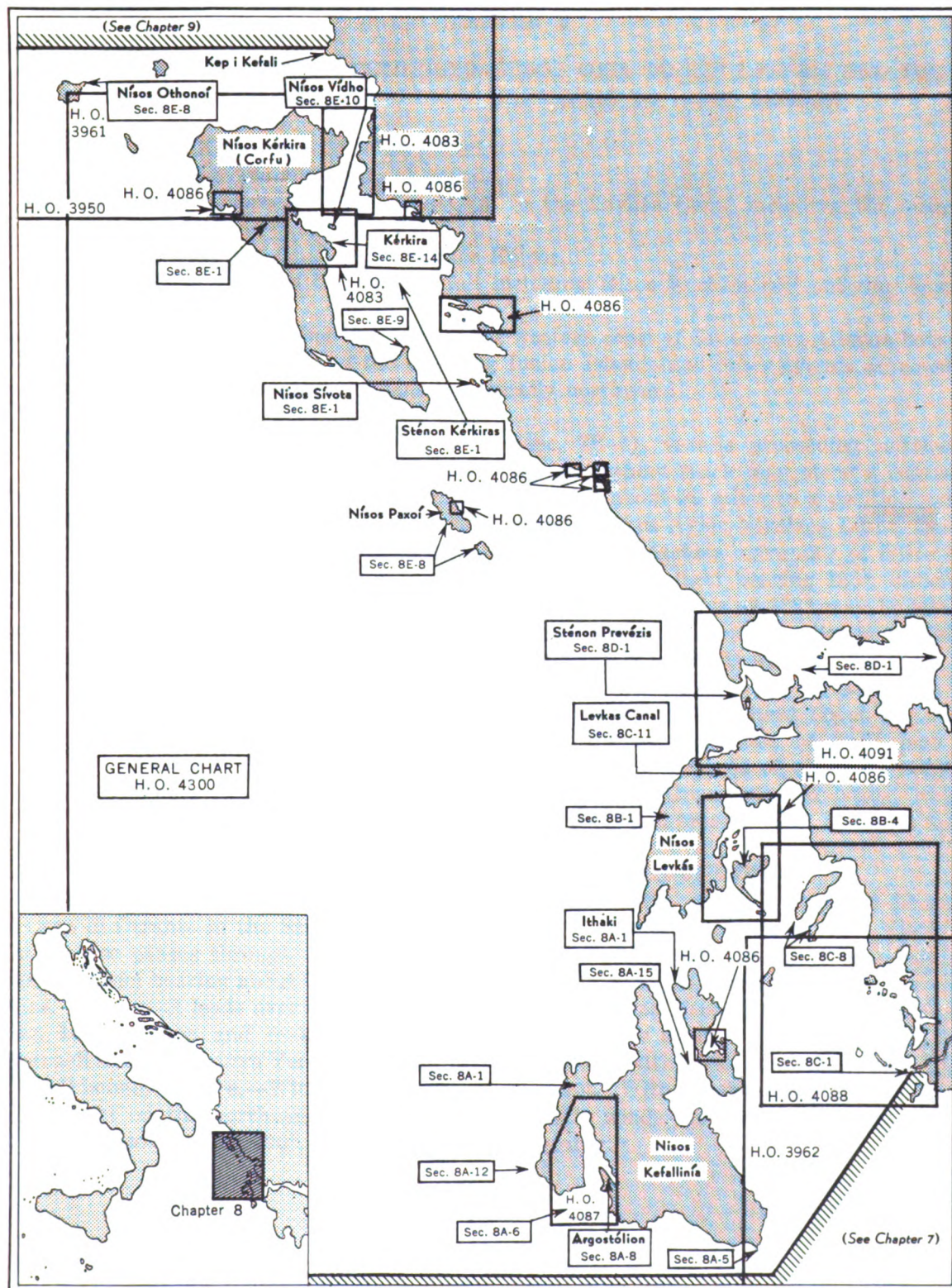


Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Naval Oceanographic Office.

Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 8—GRAPHIC INDEX

CHAPTER 8

WEST COAST OF GREECE, CONTINUED—NISOS OXIÁ TO KEP I KEFALI AND THE IONIAN ISLANDS FROM NISOS KEFALLINIA TO NISOS KÉRKIRA

Part A. Nísos Kefallinía and Nísos Itháki.

Part B. Nísos Levkás and adjacent islands.

Part C. Coast of Greece from Nísos Oxiá to the Levkás Canal including the outlying islands.

Part D. Sténon Prevézis and Amvrakikós Kólpos.

Part E. Sténon Prevézis to Kep i Kefali including Nísos Kérkira and outlying islands.

Plan.—This chapter describes that part of the western coast of Greece and Albania between Nísos Oxiá and Kep i Kefali and the off-lying Ionian Islands and other islands adjacent to that section of coast. The arrangement is generally northward.

GENERAL REMARKS

8-1 The irregular coast between Nísos Oxiá and Kep i Kefali, 110 miles northwestward, is generally steep-to and rugged and rises to extreme elevations close inland. There are numerous small areas of coastal plain, mostly cultivated, lying between the mountains. Numbers of small, steep islands and islets are scattered off the coast while the outlying larger islands of the Ionian group have the same mountainous characteristics of the mainland.

NAVIGATION

8-2 Northbound, offshore.—With Ákra Yerogómbos Light bearing 063°, distant 3.7 miles, a course of 333° may be steered to a position about 21 miles east-northeastward of Capo di Otranto in the Strait of Otranto. This course passes through a position with Nísos Othonoi bearing about 064°, distant 10 miles. This track leads over depths of more than 100 fathoms and makes its nearest approach to land off Ákra Yerogómbos Light.

Northbound, inshore.—With Nísos Kavkalídhia Light on the northwestern extremity of Pelóponnisos bearing 090°, distant 3 miles

(sec. 7B-4), vessels proceeding northward on the inshore track may steer a course of 333° for about 39 miles to a position northward of Ákra Ayios Nikólaos Light, located on the northeastern extremity of Nísos Itháki, with that light bearing 180°, distant 2 miles; then a course of 282° may be steered for a distance of about 11 miles to a position westward of Ákra Doukáton Light, on the southwestern tip of Nísos Levkás, with the light bearing 090°, distant about 4½ miles. From thereon a course of 325° may be steered for a distance of about 92 miles to a position southwestward of Nísos Othonoi with the island bearing 056°, distant 5 miles.

CURRENTS—WINDS

8-3 Off the western coast of Greece a general current sets from the Kikládhes (Cycladhes) along the coast and into the Adriatic Sea. Its strength is greatest near the coast and decreases with the distance offshore. Its average velocity off the coast of Greece, with good weather, is from ½ to ¾ knot. With strong westerly and southeasterly winds the velocity is increased considerably.

PART A. NÍSOS KEFALLINÍA AND NÍSOS ITHÁKI**COAST—GENERAL**

8A-1 Nísos Kefallinía, the largest of the Ionian Islands, lies in the western approach to Patrāikós Kólpos with Ákra Moúnda, its southeastern extremity, in a position about $17\frac{1}{2}$ miles northwestward of Ákra Killíni, on Pelóponnisos, and about $8\frac{1}{2}$ miles north-northeastward of Ákra Skinári, the northern extremity of Nísos Zákynthos.

The island is mountainous and irregular in shape with a length of about 25 miles and a greatest width of about 13 miles. Áinos, the summit of the island, is 5,218 feet high and situated about 7 miles northwestward of Ákra Moúnda.

Nísos Itháki lies off the northern part of the eastern coast of Nísos Kefallinía from which it is separated by Porthmós Ithákis, a channel with a least width of about $1\frac{1}{2}$ miles. Nísos Itháki, about 12 miles long in a general northerly and southerly direction, is nearly bisected by Kólpos Mólou, which indents its eastern side and reduces the width of the island at this place to less than $\frac{1}{2}$ mile. Anoyí, a mountain on the northern part of the island, has an elevation of 2,572 feet, and Óros Áyios Stéfanos, 2,126 feet high, is the summit of the southern part of the island.

Porthmós Ithákis is straight and deep and adequately lighted for night navigation.

DEPTHS AND DANGERS

8A-2 The coast of Nísos Kefallinía is generally steep-to, all dangers being contained within the 20-fathom curve, which lies at its greatest distance about $2\frac{1}{2}$ miles off the southern part of the island.

Nísos Itháki is steep-to, all dangers being confined within the 20-fathom contour, which lies at most $\frac{1}{2}$ mile off the eastern side of the island.

Kakava Shoal, a reef with a least depth of

$1\frac{1}{4}$ fathoms, extends about $1\frac{1}{4}$ miles south-eastward from Ákra Moúnda. A detached 3-fathom patch lies on the southwestern edge of the reef. Another detached patch of $1\frac{1}{4}$ fathoms lies off the northeastern edge of the reef.

Nísís Dhanistís (Danisti), a barren whitish rock 9 feet high, lies about $\frac{1}{2}$ mile southward of Ákra Liáka, a rock fringed cape on the southern coast of Nísos Kefallinía located about $10\frac{1}{2}$ miles west-northwestward of Ákra Moúnda. At times the sea breaks heavily over this rock.

Nísís Dhía (Nísís Thionisi), a rocky islet about 80 feet high, lies about 1 mile west-northwestward of Nísís Dhanistís. A monastery stands on the summit of this islet.

Several rocky patches lie off the coast between Ákra Liáka and Ákra Ayía Pelayía, situated about $2\frac{1}{2}$ miles west-northwestward. Vessels should pass southward of Nísís Dhanistís and Nísís Dhía. A reef, with a depth of 2 fathoms at its extremity, extends about 1 mile southeastward from Ákra Ayía Pelayía. Two rocks that do not cover lie in this area.

The several dangers in Kólpos Argostolióu and its approaches are included in the description of that gulf (sec. 8A-6).

Nísos Dhaskalió, a 10-foot islet lying about $\frac{1}{2}$ mile off the northeastern coast of Nísos Kefallinía, has surrounding depths of 5 fathoms.

A 5-fathom patch lies about $\frac{1}{4}$ mile off the northeastern coast of Nísos Itháki, slightly southward of the entrance to Órmos Fríkes, a large bay in that part of the island.

8A-3 NAVIGATION

Vessels bound from Pátrai (sec. 7C-17) to ports in the Adriatic Sea may steer a course of 272° toward Ákra Dhikhália, the western entrance point of the southern end of Pórtmos Ithákis. When Ákra Áyios Ioánnis, the southeastern extremity of Nísos Itháki,

bears 087° a course of 323° for a distance of about 5½ miles leads to a position about 1 mile southwestward of the light structure on the western extremity of the isthmus connecting the northern and southern parts of Nísos Itháki. From this position a course of 342° for a distance of 7½ miles leads to a position about ¾ mile northeastward of Ákra Fiskhádo, near the northern extremity of Nísos Kefallinía, where a course of 320° may be set for the Strait of Otranto.

8A-4 Winds and currents.—Northeast-erly and southeasterly winds prevail in Kólpos Argostolióu during the winter months and northwesterly winds during the summer months. Heavy squalls occur frequently during the winter months.

Strong northerly and northwesterly winds appear to drive the water out of Órmos Liv-ádhi. On the cessation of these winds the water flows back into the bay, resulting in the formation of a northerly current with a velocity of about 1 knot.

THE SOUTHERN COAST OF NISOS KEFALLINIA

8A-5 Ákra Mounda (38°04'N., 20°47'E.), the southeastern extremity of Nísos Kefallinía, is a bold cape, the face of which consists of a 100-foot steep cliff. A dangerous wreck lies close eastward of Ákra Mounda. Northward of the cape the land is low and cultivated. Kakava Shoal is described in section 8A-2.

Ákra Liáka, situated about 10½ miles west-northwestward of Ákra Mounda, is a low shelving point rising gradually to cultivated land inland. Between Ákra Mounda and Ákra Liáka the greater part of the coast consists of white cliffs, 100 to 300 feet high, with intervening sandy beaches. A light is shown on Ákra Cataleo, about 2 miles westward of Ákra Mounda.

Ákra Áyios Nikólaos (38°07'N., 20°29'E.), a low shelving point, is situated about 4 miles northwestward of Ákra Liáka. Nísos Áyios Nikólaos, rocky and 12 feet high, lies close northwestward of the cape, and a sunken rock, which breaks, lies about 300 yards west-southwestward of this islet.

Nísos Vardhiánoi, low, narrow, and about ¾ mile long, lies about 1 mile offshore about 3 miles west-northwestward of Ákra Áyios Nikólaos. The island is surrounded by a reef that extends about ¼ mile southward and ¾ mile westward from it. Between the island and the mainland, about 1½ miles northward, the ground is foul with shallow patches; it should not be used except with local knowledge. A light is shown near the southeastern tip of the island.

Ákra Akrotíri, situated about 1½ miles west-northwestward of Nísos Vardhiánoi, is the termination of a low promontory that projects in a southerly direction from the coast for about ¾ mile. This cape is fringed by rocks and shoal water. Akrotíri Reef, with a least depth of 6.5m (3 1/2 fm) and which breaks occasionally, extends in a south-southeasterly direction from Ákra Akrotíri for about 1 1/4 miles.

8A-6 Kólpos Argostoliou, which indents the western part of the southern coast of Nísos Kefallinía about 7½ miles, is entered between Ákra Áyios Yeóryios, situated about 2½ miles east-northeastward of Ákra Akrotíri, and Ákra Lardhigós, situated about the same distance northward of Ákra Áyios Nikólaos. It is about 1½ miles wide at its entrance, this width varying only slightly from within the entrance to the head of the gulf.

Prohibited anchorage.—An area in which anchoring is prohibited exists in the southern approach of Kólpos Argostólion.

A peninsula projects in a northwesterly direction from the southern part of the eastern side of the gulf for nearly 3 miles, forming a sheltered harbor between it and the land eastward. The town and port of Argostólion is situated near the middle of the eastern side of this peninsula. The land on the eastern side of the gulf is higher and steeper than that on the western side, which is comparatively low.

There are general depths of 18.3m (10 fm) to 28m (15 fm) in the gulf which shoals gradually toward its head. The northern half of the gulf is known as Ormos Livadhi.

Dangers.—Kalafati Reef, which breaks and over which there are depths of less than 1.8m (1 fm), extends in a south-southeasterly direction from Akra Ayios Yeóryios for nearly 1 mile.

A wreck, with 9.1m (5 fm) over it, lies sunk about 800 yards west-northwestward of Akra Lardhigos.

A detached shoal, with a least depth of 7.3m (4 fm), lies about 1/4 mile westward of Akra Ayios Theodoros, the northwestern extremity of the peninsula projecting from the southern part of the mainland on the eastern side of the gulf.

Another detached shoal, with a least depth of 3.6m (2 fm), lies about 1/3 mile offshore about 3/4 mile southward of Akra Ayios Theodoros.

Akra Lardhigós, 143 feet high, is the northwestern extremity of a small promontory that forms the eastern entrance point of Kólpos Argostólion. A conspicuous con-

crete plant, painted white, stands about 450 yards south-southeastward of the northernmost projection of Akra Lardhigos.

Akra Ayios Theodoros on which a light is shown, a low rocky point situated about 2 miles north-northwestward of Akra Lardhigos, is the northwestern extremity of the peninsula forming the western side of the harbor of Argostólion.

Akra Kókkinos Vrákhos, situated about 1 mile northeastward of Akra Ayios Theodoros, is the northeastern entrance point of Argostólion harbor and can be identified by its reddish-colored cliffs. A conspicuous church, consisting of a square red-roofed building, stands a short distance inland about 1½ miles northward of Akra Kókkinos Vrákhos.

The western side of Kólpos Argostólion is low and fronted by depths of less than 9.1m (5 fm) to a distance of about 1/3 mile. There are few distinguishing features on this side of the gulf and the only good landmark is the town and port of Lixóúrión, which is situated about 2¼ miles northward of Akra Ayios Yeóryios.

Lixóúrión Harbor ($38^{\circ}12' N.$, $20^{\circ}27' E.$) is formed by two breakwaters projecting from the shore. The southern breakwater extends in an easterly direction for a distance of about 308 yards and then curves northward for about 330 yards. The northern breakwater extends in an easterly direction from the shore for a distance of about 290 yards. The harbor entrance is about 135 yards wide between the breakwaters with depths of 4.3m (2 1/4 fm) in the entrance and in the approaches to them.

The general depths in the middle of the harbor are from 4.3m (2 1/4 fm) to 5m (2 3/4 fm).

Northeasterly and southeasterly winds raise a considerable sea within the harbor and render it unsafe for all but small vessels that are able to secure alongside the breakwater. A light is shown on the extremity of the southern breakwater at Lixóúríon. Ferry service is maintained between Lixóúríon and Argostólion.

A submarine cable extends from the root at the south breakwater to Ákra Áyios Theódhoros. Another cable extends from the shore about $\frac{1}{2}$ mile southward of the root of the south breakwater to the western shore of the peninsula.

The outer extremities of the north and east breakwaters have been partially destroyed. A light buoy is moored close off the submerged part of the east breakwater.

The town has a population of about 4,500 in 1957. Small amounts of currants, olive oil, wheat, and slate are exported. Vessels up to 12-foot draft may moor alongside the wharf inside the harbor. Four lighters are available for ships working cargo in the anchorage. Fuel and water are available in limited quantities. There is a hospital.

Directions for entering Kólpos Argostólion and the approaches to Lixóúríon and the harbor of Argostólion, will be found in section 8A-9.

8A-7 Anchorage for large vessels may be had about $\frac{1}{2}$ mile northeastward of the harbor entrance in depths of 11m (6fm) to 18.3m (10 fm) mud bottom. Vessels drawing not more than 12 feet can anchor in the northeastern part of the harbor in depths of about 4.6m (2 $\frac{1}{2}$ fm).

ARGOSTOLION

Position: 38°11'N., 20°31'E.

Depths:

Harbor entrance, 20.1m (11 fm) to 21.9m (12 fm).

Anchorage, 18.3m (10 fm).

Main quay, 7m (23 ft.).

8A-8 The harbor of Argostólion is entered between Ákra Kókkinos Vrákhos and a point about $\frac{1}{2}$ mile east-northeastward of Ákra Áyios Theodhóros. The harbor is about

$\frac{3}{4}$ mile wide at its entrance and extends in a general southerly direction for nearly 2 miles where it is crossed by a bridge and a causeway that separate it from Límni Koútavos, a shallow lake to the southward.

Wind and current.—Fine weather generally prevails in the harbor although severe squalls sometimes occur. The appearance of low white clouds over the hills southward of the town usually indicate the approach of strong southerly winds. Similar clouds over the mountains backing the eastern side of the harbor indicate the approach of strong northerly winds.

The tidal range in the harbor is greatly influenced by the winds, the maximum range being only 1 $\frac{1}{2}$ feet. The currents in the harbor are negligible.

Depths.—There are general depths of 20.1m (11 fm) to 21.9m (12 fm) in the northern part of the harbor. Less water than charted was reported in 1967. The eastern side of the harbor is fairly steep-to, but its western side is fringed by shoal water, with depths of less than 9.1m (5 fm), to a distance of about 300 yards. Except for a dredged area in front of the town of Argostolion, the depths in the southern part of the harbor, from the causeway to a position about $\frac{2}{3}$ mile northward of it, are less than 5.5m (3 fm).

Caution.—Vessels entering Argostolion harbor should exercise extreme caution because of changes in depths resulting from earthquakes; depths of 5.5m (3 fm) were reported in 1956.

Landmarks.—The prison building near the northern end of Argostólion is conspicuous. There are several conspicuous windmills located on the southeastern side of the harbor. An obelisk standing near the center of the causeway is also conspicuous.

8A-9 Anchorage.—Large vessels usually anchor near the middle of the harbor about $\frac{1}{3}$ mile north-northeastward of the conspicuous statue in depths of 18.3m (10 fm), soft mud bottom. Smaller vessels can anchor closer in toward the eastern side of the harbor. This anchorage is exposed to southerly winds. There are several mooring buoys in the harbor. The large bay, Órmos Livádhi, northwestward of Argostólion harbor, is sheltered from all winds except southerly

and can accommodate a large number of vessels. There is good shelter in Órmos Livádhí in 18.3m (10 fm), mud, from strong north-westerly winds. Secure anchorage in all weathers may be had off Akra Kokkinos Vrakhos (Red Cliffs) in about 21.9m (12 fm), mud.

A light is shown about 300 yards eastward of the northern end of the town. This light marks the eastern extremity of a shoal, with depths of less than 5.5m (3 fm), that extends from the shore.

Pilotage is compulsory for all foreign merchant vessels. Vessels are boarded inside the harbor a short distance from the above light.

8A-10 Directions. — From a position about $1\frac{1}{4}$ miles westward of Akra Áyios Nikólaos a midchannel course of about 355° for nearly 5 miles will lead to a position about $\frac{1}{2}$ mile off the breakwaters at Lixóúrión where a direct course may be steered for the harbor entrance or the anchorage north-eastward of the town.

From the position about $\frac{1}{2}$ mile eastward of the entrance of the port of Lixóúrión, vessels bound for the harbor of Argostólión may steer a course of about 100° for a distance of about $1\frac{1}{2}$ miles until the northern extremity of the peninsula forming the western side of Argostólión harbor is in range about 241° with Akra Áyios Theodhóros. A course of about 143° may then be steered direct to the anchorage. This course clears the shoals in the vicinity of Akra Áyios Theodhóros and leads over depths of not less than 18.3m (10 fm).

8A-11 Argostólión, the largest town on Nisos Kefallinía and the capital of the island, extends along the middle of the eastern side of the peninsula that forms the western side of Argostólión harbor. The town had an estimated population of about 7,000. There is about 700 feet of berthing space available with depths of 6.8m (22 $1\frac{1}{2}$ ft.), but most vessels anchor or secure to the mooring buoys.

No dry provisions are available, but limited quantities of good quality fresh provisions can be procured. Water, hard and contaminated, can be secured at the quay, and lube and diesel oil and gasoline are available in drums. The town has telephone and radio facilities; there is steamer connection to other

Greek ports. A hospital with a capacity of 200 beds will accept seamen.

THE SOUTHERN COAST OF NISOS KEFALLINÍA (Continued).

8A-12 Akra Yerogómbos ($38^\circ 11' N.$, $20^\circ 21' E.$), a rocky headland situated about $2\frac{3}{4}$ miles northwestward of Akra Akrotíri, is the western extremity of the southern coast of Nisos Kefallinía. A light is shown from the cape.

THE WESTERN COAST OF NISOS KEFALLINÍA

8A-13 Between Akra Yerogómbos and Akra Athéras, located about $11\frac{1}{2}$ miles north-northeastward, the coast is mostly bold cliffs indented by small sandy bays and having numerous sunken rocks lying close offshore.

Akra Skíza (Kabbo), about $1\frac{1}{4}$ miles northward of Akra Yerogómbos, has a monastery on the high northern side.

Akra Athéras, the northwestern extremity of Nisos Kefallinía, is a bold headland that can be identified by the steep white cliffs on its western side.

Órmos Athéras, small, deep, and with a sandy beach at its head, is entered between Akra Athéras and Akra Kakáta, about 2 miles eastward.

Kólpos Mírtou is entered between Akra Kakáta and Ássos Peninsula, about 4 miles northeastward. This bay is of little importance to shipping because of its exposed position and great depths. Ássos Peninsula, a 440-foot double-peaked promontory, has the conspicuous ruins of a fortress, now a prison, on its outer area.

Ássos, a village, lies at the head of a small bay of the same name, the western side of which is formed by Ássos Peninsula. There is temporary anchorage close northward of the village in depths of 24m (13 fm) to 31m (17 fm). Ássos has telephone and telegraph facilities.

Akra Vhotti, the northern extremity of Nisos Kefallinía, lies about 5 miles northward of Assos and is low, cliffy, and steep-to. The coast southward of this cape is 50 to 150 feet high and consists of reddish-colored cliffs with cultivated ridges inland.

THE EASTERN COAST OF NISOS KEFALLINÍA

8A-14 Akra Kápri ($38^{\circ}07' N.$, $20^{\circ}49' E.$), the easternmost point of Nisos Kefallinía, is bold and steep-to. A 543-foot sharp-topped wooded hill rises just westward of this cape. A light is shown on Akra Kápri.

Akra Sarakíni (Prónos), situated about $2\frac{1}{2}$ miles north-northwestward of Akra Kápri, is a narrow peninsula. A light is shown from the head of a small pier in the cove on the western side of the peninsula.

Akra Agriósiko (Grosso), about $6\frac{1}{2}$ miles north-northwestward of Akra Sarakíni, is a 130-foot perpendicular cliff that rises abruptly from the sea.

Akra Dhikhália ($38^{\circ}17' N.$, $20^{\circ}41' E.$), the western entrance point of the southern end of Porthmós Ithákis, is situated about 3 miles north-northwestward of Akra Agriósiko. This bold headland has a 525-foot conspicuous peak that rises close southwestward of the extremity of the cape. A light is shown on Akra Dhikhália. Órmos Anti Sámis, immediately southeastward of Akra Dhikhália, affords temporary anchorage during the summer in depths of from 10 to 12 fathoms.

Between Akra Dhikhália and Akra Agriósiko (Agriossiko Bluff), about $3\frac{1}{2}$ miles northwestward, a large bight indents the coast nearly 2 miles. Kolpós Sámis, the southern part of the bay, is sheltered from all except northerly winds. A light is shown from the head of a small mole at the village of Sami, situated on the southern shore of Kolpos Samis. The harbor has an average depth of 23 feet. Large vessels anchor outside the harbor; medium size vessels anchor in the harbor. Medium size vessels can go alongside the length of the arm of the pier

on the inner side and med-moor on the outside and the head. This village has telephone and telegraph facilities.

Órmos Ayía Evfimía (Órmos Pílaros), a small bay that indents the northwestern part of the bight, is located about $1\frac{1}{2}$ miles southwestward of Akra Agriósiko. The village of Ayía Evfimía lies at the head of this bay. A light is shown from a mole.

Akra Fiskárdho ($38^{\circ}28' N.$, $20^{\circ}35' E.$), about 9 miles north-northwestward of Akra Agriósiko, has Órmos Fiskárdho situated immediately southward. A light is shown on Akra Fiskárdhó. A 30-foot tower stands near the light structure, and on an elevation inland from the cape a square ruin is conspicuous from the southward. A light is shown from the head of a small breakwater about $\frac{1}{4}$ mile westward of Akra Fiskardho. The village of Fiskardho lies on the western shore of the bay and has telephone and telegraph facilities. The church in the village is a conspicuous landmark approaching from the southward.

THE WESTERN COAST OF NISOS ITHAKI

8A-15 Porthmós Ithákis, is entered from the southward between Akra Dhikhália and Akra Ayíos Andréas, the southern extremity of Nisos Itháki. The strait is about 13 miles long in a general northerly and southerly direction and has great depths.

On the eastern shore of Porthmós Ithákis the western coast of Nisos Itháki trends quite regularly in a north-northwesterly direction from Akra Ayíos Andreas to Akra Batístas the northwestern extremity of the island and about $11\frac{1}{2}$ miles distant.

Akra Aitos, on the western extremity of the isthmus connecting the northern and southern parts of Nisos Itháki, is situated about $4\frac{1}{4}$ miles north-northwestward of Akra Ayíos Andréas. A light is shown on Akra Aitos.

Órmos Pólis is situated about 5 miles north-northwestward of Akra Aitos, the coast between being backed by high land.

There is a depth of 17 fathoms in the middle of the bay; small vessels anchor near the shore. There is a small jetty for boats at the head of the bay.

Ákra Batístas (Βασιλ) lies about $2\frac{1}{2}$ miles north-northwestward of Órmos Pólis; the coast between is steep-to and backed by high land.

THE EASTERN COAST OF NISOS ITHÁKI

8A-16 The eastern coast of Nisos Itháki is considerably more irregular than its western coast, being indented by numerous small bays and coves.

Ákra Áyios Ioánnis ($38^{\circ}19' N.$, $20^{\circ}47' E.$), the southeasternmost point of Nisos Itháki, is situated about $2\frac{1}{4}$ miles east-northeastward of Ákra Áyios Andréas. A light is shown on Ákra Áyios Ioánnis.

Nísís Perapigádhí, about $\frac{1}{2}$ mile long, lies close off the coast about 1 mile northwestward of Ákra Áyios Ioánnis.

Ákra Sarakíniko, about $2\frac{3}{4}$ miles northward of Ákra Áyios Ioánnis, has a bay of the same name immediately southward of it, but being open to the southeastward it affords no anchorage.

Ákra Skínos, about $2\frac{1}{2}$ miles northwestward of Ákra Sarakíniko, is the southeastern entrance point of Kólipos Mólou. **Ákra Áyios Ilías**, the northwestern entrance point to the gulf, is situated about $2\frac{1}{2}$ miles northward of Ákra Skínos. From Ákra Áyios Ilías the western side of the gulf trends regularly south-southwestward about $4\frac{1}{4}$ miles to its head and is steep-to. The general depths in the gulf are great. The southeastern side of the gulf is indented by several bays, the largest and most important being Órmos Vathí. A light is shown on Ákra Áyios Andréas, the northwestern extremity of a promontory extending from the coast about $\frac{3}{4}$ mile southwestward of Ákra Skínos.

8A-17 **Nísís Skartsopou** (Katzurbo-nisi) lies in the approach to Órmos Vathí about $\frac{1}{2}$ mile south-southwestward of Ákra Áyios Andréas. A light is shown on the northern extremity of this islet.

ITHÁKI

Position: $38^{\circ}22' N.$, $20^{\circ}43' E.$

Depths:

Harbor entrance, 21 fathoms.

Anchorage, 8 to 10 fathoms.

Quays and jetties, 5 to 14 feet.

8A-18 The harbor of Itháki is located at the head of Órmos Vathí, which is entered between Ákra Kéfalos, about $\frac{1}{2}$ mile southward of Ákra Áyios Andréas, and the northern extremity of Nísís Perapigádhí. The entrance has a least width of about 225 yards, but within the entrance the bay opens up to a width of nearly $\frac{1}{2}$ mile and then converges gradually toward its head. There are general depths of 10 to 16 fathoms in the greater part of the bay, but the area near its head is shoal.

An islet, on which stands a prison, lies near the extremity of a shoal that extends in a northerly direction from the western side of the bay. A light is shown from the prison.

A conspicuous monument stands on the extremity of a jetty that projects from the eastern side of the bay.

Winds and tide.—During the winter months strong westerly and northwesterly squalls occur quite frequently. Clouds gathering over the mountains in the northern part of the island indicate the approach of a squall, the severity of which can be gauged by the density and darkness of the clouds.

There is a regular 6-hour rise and fall of the tide, but its spring range seldom exceeds 1 foot. Currents in the bay are negligible.

Anchorage.—The most suitable anchorage is between the prison islet and the western shore in a depth of about 8 fathoms, mud and

sand. Vessels anchoring in this position can secure their sterns to the shore where ring bolts are provided for this purpose.

Anchorage may also be had eastward of the islet in depths of 9 to 10 fathoms.

8A-19 Directions.—Vessels should approach Kólpos Mólou to a nearly midchannel position. When Ákra Skínos bears 118°, distant about $\frac{3}{4}$ mile, a vessel should change course and steer for Nísíς Perapigádhí until nearly in a midchannel entrance position with the entrance of Órmos Vathí wide open with the head of the bay, when a course of about 131° should lead to the anchorage eastward of the prison islet.

Itháki, the capital and principal town of Nísos Itháki, extends along the shore at the head of Órmos Vathí. In 1950 the estimated population was about 4,000. Part of the southern shore of the port is quayed. It provides about 1,200 feet of berthing space, of which about 350 feet has depths up to 12 feet for vessels breasted off. Central Pier, close eastward of the above quay, has depths of 5 to 9 feet alongside. The customhouse is located on this pier. There are several small marine railways for lighters. The town has telephone service, and there are regular steamer connections with other Greek ports.

THE EASTERN COAST OF NÍSOS ITHAKI (Continued)

8A-20 Northward of Kolpos Molou the coast is irregular and indented by several bays, none of any importance to shipping.

Órmos Fríkes is about 2 $\frac{3}{4}$ miles northwestward of Ákra Ayios Ilias. A small harbor is formed at the head of the bay by a 590-foot breakwater; vessels with a maximum draft of 15 feet can berth along its inner side. A light is shown from the head of the breakwater.

A light is shown on Ákra Ayios Nikólaos, about 2 miles north-northeastward of the light in Órmos Fríkes.

Kólpos Afálon, entered between Ákra Mélissa, the northern extremity of Nísos Itháki, and Ákra Batístas, indents the northern part of the island to a distance of about $1\frac{1}{2}$ miles. This gulf is open to the northwestward and is too deep to provide a secure anchorage.

Nísos Arkoúdhí, about 2 miles long and 441 feet high, lies about $3\frac{1}{2}$ miles northeastward of Ákra Mélissa. A sunken rock is

charted about 400 yards off its southeastern extremity, and foul ground extends about the same distance from its southwestern extremity; otherwise the island is steep-to. The channels northward and southward of this island are wide, deep, and clear.

Nísos Átokos (38°29' N., 20°48' E.), steep-to, 1,095 feet high, and about 2 miles long, lies about 5 miles southeastward of Nísos Arkoúdhí and about the same distance northeastward of Ákra Ayios Ilias, on the eastern coast of Nísos Itháki. The summit of the island, situated near its southern end, consists of three peaks of approximately equal height, forming an excellent landmark.

ANCHORAGES

8A-21 Lixóúríon.—See section 8A-7.

Argostólion harbor.—See section 8A-9.

Assos.—See section 8A-13.

Órmos Anti Sámis.—See section 8A-14.

Kólpos Sámis.—Vessels of moderate length can anchor about $\frac{1}{4}$ mile northwestward of the light on the mole, in a depth of 12 fathoms, mud and sand. Large vessels should anchor farther out. Vessels drawing not more than 10 feet can moor with their sterns secured to the mole.

Órmos Fiskárdho.—During westerly and northwesterly gales vessels can find sheltered anchorage about 400 yards southward of the light structure on Ákra Fiskárdho in depths of 11 to 14 fathoms.

Órmos Polís.—See section 8A-15.

Órmos Vathí.—See section 8A-18.

PART B. NÍSOS LEVKÁS AND ADJACENT ISLANDS

COAST—GENERAL

8B-1 Nísos Levkás, the third largest of the Ionian Islands, lies in the southern approaches of Sténon Prevézis (sec. 8D-1) with Ákra Doukáton, its southwestern extremity, in a position about $5\frac{1}{4}$ miles northward of Ákra Vlióti, on Nísos Kefallínia. The mountainous, irregularly-shaped island is about 19 miles long and about 8 miles wide at its southern part. Stavrotós, the highest peak

on the island, has an elevation of 3,796 feet. The northeastern end of Nísos Levkás is separated from the mainland by a narrow channel through which a canal has been dredged. Nísos Meganísi, a comparatively large island, and several smaller islands lie off the eastern coast of Nísos Levkás. A light is shown about $\frac{1}{4}$ mile northeastward of Ákra Doukáton.

DEPTHS — DANGERS — OFF-LYING ISLANDS

8B-2 Nísos Levkás is generally steep-to along most of its western, southern, and northeastern coasts, and all dangers are contained within the 10-fathom curve, which lies not over $\frac{1}{2}$ mile off the coast in any of the above areas.

Several shoals and islets lie off the steep-to eastern side of the island and are described with the area in which they are situated.

Nísos Sésoula ($38^{\circ}42' N.$, $20^{\circ}32' E.$), a rock 114 feet high, lies about $1\frac{1}{2}$ miles off the western coast of Nísos Levkás and about 8 miles northward of Ákra Doukáton. A light is shown from Nísos Sésoula.

NAVIGATION

8B-3 Vessels bound from Pátrai to ports in the Adriatic Sea can use either Porthmós Ithákis (sec. 8A-15) or the channel between Nísos Itháki and Nísos Levkás. From a position about 1 mile southward of the light structure on Nísos Oxiá (sec. 7C-2) a course of 308° may be steered for about $25\frac{1}{2}$ miles to a position about 2 miles northward of Ákra Áyios Nikólaos. From this position a course of 282° for $10\frac{3}{4}$ miles leads to a position about $2\frac{3}{4}$ miles west-southwestward of Ákra Doukáton, and thence a course of 320° may be set for the Strait of Otranto.

Vessels bound for Sténon Prevézis may follow the same route to a position where Ákra Doukáton bears about 081° , distant

nearly $2\frac{3}{4}$ miles. From there a course of 010° for about 16 miles leads to a position about 4 miles west-northwestward of Ákra Trakhilos, situated about $1\frac{1}{2}$ miles south-southwestward of Ákra Áyios Ioánnis, the northwestern extremity of Nísos Levkás. From thereon a course of 051° may be steered for about 11 miles to the light buoy moored at the outer end of the dredged channel off Sténon Prevézis. These courses lead over depths of not less than 9 fathoms and about $\frac{3}{4}$ mile westward of Nísos Sésoula, the nearest land approach.

COASTAL FEATURES—LANDMARKS

8B-4 From Ákra Doukáton to Ákra Áyios Ioánnis, the western coast of Nísos Levkás trends quite regularly in a north-northeasterly direction for about 17 miles. There is often a perceptible current near Ákra Doukáton.

Ákra Pídhimatis Sappoús (Sappho's Leap), a conspicuous white triangular cliff, 780 feet high, is situated about 2 miles northward of Ákra Doukáton.

Ákra Áyios Ioánnis, a bold cliffy headland forming the northwestern extremity of the island, is the southwestern entrance point of Órmos Fléva.

Ákra Yerápetra (Gyrápetra) ($38^{\circ}51' N.$, $20^{\circ}41' E.$), the low northern extremity of Nísos Levkás, is the northeastern entrance point of Órmos Fléva. Foul ground extends about $\frac{1}{4}$ mile from the cape. Several windmills are situated on the shore near the head of Órmos Fléva. The narrow peninsula extending eastward from Ákra Yerápetra has its eastern end as the western entrance point of the northern part of the channel separating Nísos Levkás from the mainland.

The southern coast of Nísos Levkás is considerably more irregular than its western coast and is indented by several bays and

coves, the largest of which is Órmos Vasilikís.

Órmos Vasilikís is entered between Ákra Doukátou and Ákra Lipsó, situated about $4\frac{1}{2}$ miles east-northeastward. This bay provides excellent shelter; the best anchorage being in 12 to 15 fathoms off the head of the bay, sand bottom. Good anchorage may also be found about $\frac{1}{2}$ mile westward of the village of Vasilikí, situated at the eastern end of the sandy beach, in a depth of 10 fathoms, mud. A light is shown on the head of the breakwater at Vasiliki.

A bank of 10 fathoms lies about $1\frac{1}{2}$ miles eastward of Ákra Lipsó.

Óros Póros (Porro) is the 1,670-foot summit of a mountainous ridge, the termination of which forms the southeastern extremity of Nízos Levkás, about $4\frac{1}{2}$ miles northeastward of Ákra Lipsó. Órmos Rouðha is immediately westward of the Óros Póros promontory.

Nízos Meganísi lies off the southern part of the eastern coast of Nízos Levkás from which it is separated by Sténon Meganisíou, a channel with a least width of about $\frac{1}{2}$ mile. Nízos Meganísi is 874 feet high and about 4 miles long in a general easterly and westerly direction.

Ákra Kéfali is the termination of a long narrow peninsula, which extends about 4 miles southeastward and forms a bight on the eastern side of Nízos Meganísi between it and Ákra Langádha, about 4 miles northward. Nízos Kíthros, 300-foot high, and Nísís Petalós (Petallis), 29 feet high, lie respectively about $\frac{1}{4}$ mile southwestward and about 2 miles westward of Ákra Kéfali. Between Ákra Langádha and Ákra Makríá, about $1\frac{3}{4}$ miles northwestward, there are several small inlets on the northeastern side of Nízos Meganísi.

Ákra Ayios Ilías, close off which lies a sunken rock, is situated about $\frac{3}{4}$ mile north-

northeastward of Ákra Langádha. A light is shown on Ákra Ayios Ilías.

A rock, 20 feet high, lies about $\frac{1}{2}$ mile north-northwestward of the light on Ákra Ayios Ilías and marks the outer end of a reef. A 24-foot islet, Nísís Alafomíti, lies at the outer end of a reef a short distance west-northwestward of the 20-foot rock.

8B-5 Sténon Meganisíou, with a least midchannel depth of 23 fathoms, is entered from the southward between the southeastern extremity of Nízos Levkás and the root of the long narrow peninsula extending in a southeasterly direction from the southwestern part of Nízos Meganísi. About 2 miles from the entrance points Nísís Thilía (Tiglia), 130 feet high, lies about 250 yards off the northern part of the eastern side of Nízos Meganísi. Foul ground extends about 300 feet from the southern end of Nísís Thilía and a narrow shallow bank fringes its eastern side. There is anchorage for small vessels between Nísís Thilía and Nízos Meganísi in depths of 10 to 12 fathoms, sand.

Monodhéndri (One Tree), a hill 521 feet high, stands in the northwestern part of Nízos Meganísi. The northern side of the island is indented by two bays, Órmos Spiliá (Spiglia), the southwestern bay which has the village of Spartokhóri at its head, and Órmos Vathí, the northeastern bay which has the village of Vathí at its head. These two bays afford the best anchorage in the island for small vessels having local knowledge.

Nízos Skorpiós, 186 feet high and about 1 mile long, lies about $\frac{3}{4}$ mile off the middle of the eastern coast of Nízos Levkás. Nízos Skorpídhí, a smaller island, lies close off its northern side, and Nísí Sokáva, a very small islet, lies about 200 yards off its western side.

Nízos Spárti ($38^{\circ}43'$ N., $20^{\circ}44'$ E.), narrow, 180 feet high, and about 1 mile long, lies about $\frac{1}{2}$ mile northward of Nízos Skorpídhí.

Nísí Madhourí (Moodra), 145 feet high, and Nísí Khelóni (Socava), 60 feet high, lies respectively about $\frac{1}{3}$ mile southwestward and $\frac{1}{2}$ mile northwestward of Nísos Spárti. A $1\frac{1}{4}$ -fathom patch lies about $\frac{1}{4}$ mile westward of the southern part of Nísos Spárti. Vessels proceeding through the western branch of Sténon Meganísiou between Nísos Skorpiós and Nísos Lavkás and between Nísos Skorpidhi and Nísos Spárti should not approach Nísí Sokáva too closely as foul ground extends in a north-northwesterly direction from it for a distance of about 200 yards.

Hieromiti (Ieromíti) Shoals, consisting of three rocky patches, lie nearly midway between Nísos Skorpiós and the northern side of Nísos Meganísi. Two of these patches, each with a depth of 3 feet over them, lie about $\frac{1}{2}$ mile east-southeastward of the southeastern extremity of Nísos Skorpiós, and the other patch, with a depth of 2 fathoms, lies about $\frac{1}{3}$ mile farther east-southeastward. Vessels proceeding through the eastern branch of Sténon Meganísiou can pass on either side of Hieromiti Shoals.

On the western side of Sténon Meganísiou the coast of Nísos Levkás is high and bold and trends northward for about 5 miles to the eastern entrance point of Órmos Vlikhó. This coast is indented by Órmos Dhéssimo (Dessimo) about midway of its length.

Órmos Vlikhó is entered through a narrow channel, about $\frac{3}{4}$ mile long, in which there is a least depth of 4 fathoms. There is high land on all sides of the bay and its shores are bordered by a bank with depths of less than 3 fathoms. Anchorage may be had in the middle of the bay in general depths of 4 fathoms. The village of Vlikhó is situated on the western side of the head of the bay. A customs and health office are maintained.

ANCHORAGES

8B-6 Órmos Vasilikís.—See section 8B-4.

Nísí Thiliá.—See section 8B-5.

Órmos Spiliá.—See section 8B-5.

Órmos Vathí.—See section 8B-5.

Órmos Vlikhó.—See section 8B-5.

PART C. COAST OF GREECE FROM NÍSOS OXIÁ TO THE LEVKAS CANAL, INCLUDING THE OUTLYING ISLANDS

8C-1 Potamós Akhelóös, the largest river in Greece, flows into the sea about $1\frac{1}{4}$ miles northward of Nísos Oxiá (sec. 7C-2). The mouth of the river is about 100 yards wide with a depth of about 2 feet on the bar, which breaks during southwesterly winds, and is shallow for a distance of $\frac{1}{2}$ mile from the entrance, the outer edge being steep-to.

COAST—GENERAL

8C-2 This very irregular coast, which trends in a general north-northwesterly direction for a distance of about 35 miles, is fronted by numerous islands. It is backed by mountains of considerable elevation with several small areas of coastal plain, mostly cultivated. With the exception of a few short stretches this coast, including the outlying islands, is steep-to.

DEPTHS — DANGERS — OFF-LYING ISLANDS

8C-3 All dangers along the coast of the mainland are contained within the 6-fathom curve, which lies at most about $\frac{1}{2}$ mile off-shore. The off-lying islands are all generally steep-to and the 6-fathom contour is again the boundary in the few instances of inshore dangers. There are, however, several other dangers in the vicinity of the islands lying off this part of the coast which will be described with the related features.

Formikoula Shoal, with a least depth of 2 fathoms, lies about $1\frac{1}{2}$ miles southeastward

of the extremity of the narrow peninsula that extends in a southeasterly direction from the southwestern part of Nísos Meganísi (sec. 8B-4). A detached 5-fathom patch lies about $\frac{1}{4}$ mile southwestward of this shoal. This shoal is the only danger encountered by vessels bound directly to Levkas Canal from Patraikós Kólpos or the southern part of Pelopónnisos.

NAVIGATION

8C-4 From a position about 3 miles westward of the light structure on Nísos Kavkalídh vessels bound from the southern part of Pelopónnisos to the Levkas Canal may steer a course of 346° for about 45 miles to a position about 1 mile eastward of the light structure on Ákra Áyios Ilías. From this position a course of 322° for 6 miles leads to a position between the entrance points of Órmos Dhrepánou, at the head of which, about 3 miles distant, lies the southern entrance of Levkas Canal. This track passes about midway between Formikoula Shoal and the southwestern extremity of Nísos Kálamos. These courses lead over depths of not less than 9 fathoms.

Vessels from Patraikós Kólpos may join this track by steering a course of 312° for about 12 miles from a position about 1 mile southward of the light structure on Nísos Oxiá.

COASTAL FEATURES—LANDMARKS

8C-5 Nísos Eghinádhes, a group of four islands, lie in the northern approaches to Patraikós Kólpos near the mouth of the Potamós Akhelóös. The southern extremity of Nísos Oxiá, the largest island in the group, forms the northern entrance point of Patraikós Kólpos (sec. 7C-2). Nísos Makrónisos, a narrow island about 2 miles long, lies with its southeastern extremity about 3 miles northwestward of Nísos Oxiá. A conspicuous

hill, 417 feet high, rises near the northwestern extremity of this island. Nísos Kounéli, a steep rocky islet 92 feet high, lies close eastward of the southeastern extremity of Nísos Makrónisos. A light is shown on Nísos Kounéli. Nísos Vromóna (Prómonas), flat-topped, 472 feet high, and the northwesternmost island of the group, lies about 1 mile westward of Nísos Makrónisos.

Khersónisos Dhióni, a narrow island-like peninsula, 288 feet high and about $1\frac{1}{2}$ miles long, lies about $\frac{1}{2}$ mile offshore about $1\frac{1}{2}$ miles northward of the mouth of the Potamós Akhelóös. Its southeastern side is connected to the mainland by a narrow neck of sand and mud.

Nísos Petalás, 832 feet high and about $2\frac{1}{2}$ miles long, lies close offshore just northward of Khersónisos Dhióni. A light is shown on Ákra Áspro, the southern extremity of Nísos Petalás. A beacon also stands on this cape.

Limín Petalás, situated between the southeastern coast of Nísos Petalás and the mainland, is entered between Ákra Áspro and the northern extremity of Khersónisos Dhióni. This harbor provides a sheltered anchorage for vessels drawing not more than 16 feet.

Shag Rock ($38^\circ 26' N.$, $21^\circ 04' E.$), 6 feet high, stands on a reef that lies about $\frac{1}{4}$ mile west-northwestward of the northwestern extremity of Nísos Petalás. Sentry Bank, a 10-fathom patch, lies about $\frac{1}{3}$ mile west-northwestward of Shag Rock.

8C-6 Nísos Dhragonéra, a group of small islands and islets and a number of above-water rocks, front the coast northwestward of Nísos Petalás and lie across the entrance to Kólpos Astakoú (Dragamesti), a bay situated about 4 miles north-northwestward of that island. These islands, which rise steeply from the sea, have navigable channels between most of them. Nísos Dhragonéra, the largest island in the group, is about $1\frac{1}{3}$ miles

long and has an elevation of 422 feet. Nísos Pondikónison, the southeasternmost island, lies about 1 mile north-northwestward of Nísos Petalás. A light is shown on the western extremity of Nísos Pondikónison.

Nísos Kalóyerós, the northernmost island, lies close off the northeastern side of Nísos Dhragonéra. A light is shown on a peak on the northeastern part of the island. A group of four islets, Nísos Cravaris, 80 feet high, Nísos Sorós, 100 feet high, Nísos Apása, 55 feet high, and Nísos Stramothi (Módhi), the largest, 229 feet high, lie southward of the main group of the Nísos Dhragonéra and about $2\frac{1}{2}$ miles westward of the northern extremity of Nísos Petalás.

Wreck Rock lies on a reef about 1 mile southwestward of the light structure on Nísos Pondikónison.

Nísos Prováti, about 1 mile long, lies $\frac{3}{4}$ mile northward of Wreck Rock. The channel between Nísos Pondikónison and Nísos Prováti is the most direct route for vessels bound for Kólpas Astakoú. Nísos Chakolonisi, 60 feet high, lies about 300 yards off the western side of Nísos Prováti.

Nísos Carlonisi, 260 feet high, lies north-northwestward of Nísos Prováti and is separated from it by Thiapori Pass, about 300 feet wide and with a least fairway depth of 9 fathoms. A 3-fathom shoal lies near the middle of the fairway of Thiapori Pass, in a position about 125 yards southeastward of the southern extremity of Nísos Carlonisi.

Day Rock, with a depth of $4\frac{1}{4}$ fathoms, lies about $\frac{2}{3}$ mile eastward of Nísos Carlonisi.

Southward of Nísos Dhragonéra lie the islets of Filíppos and Pistrós; the former is 93 feet high. Two exposed rocks lie on a spit which extends about 400 yards south-southwestward from Filíppos. Oxópetra, the northern of these rocks is 27 feet high. Pistrós is 145 feet high with two large trees near its summit. Two rocks, 3 feet high, and

a rock 2 feet high, lie close off the northeastern side of this islet.

Nísos Sofiá, 145 feet high, lies about $\frac{1}{4}$ mile westward of Nísos Dhragonéra and has Nísos Lambrínós, 205 feet high, close south-southeastward of it. There is a narrow channel with a least depth of 18 fathoms between these islets and Nísos Dhragonéra.

Davy Bank and Grant Bank, each with a depth of 7 fathoms, lie about 400 yards and 1,600 yards respectively north-northwestward of Nísos Dhragonéra.

8C-7 Nísos Prása ($38^{\circ}29' N.$, $20^{\circ}58' E.$), 42 feet high and composed of rocks and boulders, is the westernmost of the Nísos Dhragonéra. Práso Reef, about $\frac{3}{4}$ mile north-northeastward of Nísos Prása, has a depth of 5 fathoms.

A bay lies between the northern extremity of Nísos Petalás and the southern extremity of Stenigonia Peninsula, about $1\frac{1}{2}$ miles north-northeastward. The northeastern side of this bay rises steeply from the sea, and the coast is rocky and indented. Órmos Kómaros, a narrow inlet lies immediately eastward of Stenigonia Peninsula. Pondikó Shoal, with a least depth of $4\frac{1}{2}$ fathoms, lies about $\frac{1}{2}$ mile southwestward of Stenigonia Peninsula.

Órmos Platiyiáli (Plateali Harbor), which indents the coast of the mainland for a distance of about 1 mile, is entered between Stenigonia Peninsula and Ákra Carlo Glosa, about 1 mile northwestward, the entrance being about $\frac{1}{4}$ mile wide. The harbor is fringed by a bank with depths of less than 5 fathoms, but there are no dangers outside depths of 3 fathoms. Good anchorage may be had in the center of the harbor in a depth of 13 fathoms, mud, thoroughly sheltered. A light is shown near the extremity of Ákra Carlo Glosa.

Ákra Pogonia, about $\frac{3}{4}$ mile northwestward of Ákra Carlo Glosa, is the western extremity of Pogonia Peninsula which separates Órmos Platiyiáli and Órmos Pandelei-

mon. The cape is low and rocky with a spit, having a depth of $2\frac{3}{4}$ fathoms at its outer end, extending about 400 yards from the cape. A 5-foot red beacon stands on the southern extremity of Ákra Pogonia.

Órmos Pandeïmon indents the coast for a distance of about $\frac{3}{4}$ mile. The harbor is suitable only for small vessels. The village of Pandeïmon lies at the head of a shallow branch of the harbor.

Kólpos Astakoú is entered between Ákra Pogonia and Ákra Krithotí, about 2 miles west-northwestward. This bay, which has a length of about 3 miles, affords anchorage near its head in 12 to 13 fathoms, mud, with the southwestern end of the wharf bearing 302° , distant 600 yards. The town of Astakós is situated at the northwestern side of the head of the bay. A light is shown on the head of a 410-foot pier, which has 15 to 40 feet alongside. A pilot is available. A dangerous wreck lies about 250 yards north-northeastward of the pierhead. Astakós has telephone and telegraph facilities and steamer communication with Kérkira and Pátrai.

Órmos Marathiá, on the northwestern side of Kólpos Astakoú is entered between Ákra Krithotí and Ákra Metaxotó, about $\frac{1}{2}$ mile east-northeastward. Nísis Metaxotó, 14 feet high, lies near the head of the bay.

From Ákra Krithotí the coast trends northward about 10 miles to Órmos Voúrkos. With the exception of Khamiloi (Low) Rocks, which are 3 feet high and lie on a small bank, with a least depth of $2\frac{3}{4}$ fathoms, about 600 yards westward of the southeastern entrance point to Órmos Voúrkos, the coast is steep-to with a few above-water rocks lying close offshore. The land back of the coast is mountainous and thickly wooded.

8C-8 Órmos Voúrkos is entered between the point on the mainland eastward of Khamiloi Rocks and Ákra Mítika, situated about $2\frac{1}{4}$ miles northwestward. The shores of the

bay are fringed by a shoal with depths of less than 5 fathoms. The bay affords excellent anchorage well sheltered from southwesterly winds by Nísos Kálamos in depths of 12 to 15 fathoms, sand, at distances of about 1,000 yards to 1,600 yards eastward of Ákra Mítika. A light is shown on Ákra Mítika. The village of Mítika, just inland from the cape, has steamer communication with Pátrai and other ports.

Órmos Mítika, is entered between Ákra Mítika and Ákra Kamiláfka, about 1 mile west-northwestward. Ákra Kamiláfka should not be approached within a distance of 600 yards. A light is shown on Ákra Kamiláfka. There is anchorage in Órmos Mítika in depths of 10 to 15 fathoms, mud. Inland from the shore of the bay there is an area of cultivated coastal plain beyond which the mountains rise abruptly.

Venerable Banks, with a least known depth of 7 fathoms, consist of several small rocky patches situated about $3\frac{3}{4}$ miles west-northwestward of Ákra Krithotí. Deep-draft vessels should avoid this area.

Nísos Kastós, a narrow mountainous island with a greatest elevation of 485 feet and about $4\frac{1}{4}$ miles long in a general north-easterly-southwesterly direction, lies with its southern extremity about $6\frac{1}{2}$ miles northwestward of Ákra Krithotí. Órmos Sarakíniko, which has an islet 10 feet high near its head, is situated on the western side of Nísos Kastós about $1\frac{1}{2}$ miles northward of the southern extremity of the island. Nearly abreast it on the eastern side of the island is Kastós Harbor, where the village of the same name is located. A conspicuous mill is located on top of a low ridge which separates Órmos Sarakíniko from Kastós Harbor.

Nísis Mangelariá, 26 feet high, lies about 2 miles north-northeastward of the southeastern extremity of Nísos Kastós and about

200 yards off the eastern coast. *Nísí Prováti*, 200 feet high, lies about 250 yards off the northern end of *Nísis Kastós* with a least depth of 13 fathoms between.

Nísis Kálamos, the largest of the islands lying off this part of the coast, is situated northwestward of *Nísis Kastós*, from which it is separated by a deep channel with a least width of $\frac{3}{4}$ mile. The island is about 6 miles long and 2,445 feet high. The town of *Kálamos*, with a small harbor protected by a mole, is situated on the eastern side of the island about 4 miles northeastward of *Ákra Kepháli*, the southern extremity. The harbor, with depths of 11 to 13 feet, can accommodate a few small vessels. A light is shown near the northeastern extremity of the island and another at the town of *Kálamos*. A dangerous wreck lies about $\frac{3}{4}$ mile southwestward of the town of *Kálamos*.

There is anchorage northeastward of the mole in a depth of 8 or 9 fathoms about 400 yards offshore. A more protected anchorage in depths of about 30 fathoms may be had in about a midchannel position westward of *Nísí Prováti*.

8C-9 *Nísí Formikoúla* ($38^{\circ}34' N.$, $20^{\circ}52' E.$), 45 feet high, is situated about 1 mile southwestward of *Ákra Kepháli*. An above-water rock lies close off the northeastern extremity of the islet and a similar rock lies about 200 yards off the southeastern extremity of the islet. A light is shown from the latter rock. *Formikoula Shoal* (sec. 8C-3) lies about $\frac{3}{4}$ mile north-northwestward of *Nísí Formikoúla*.

Pálairos (*Zavérðhas*), a village situated on the eastern side of *Kólpos Zavérðhas*, is located about 7 miles northward of *Ákra Kamiláfka*. A light is shown from a small pier at the village. *Pálairos* has a custom-house, telephone and telegraph facilities, and regular steamer communications with other Greek ports. A conspicuous white house stands on a ridge about 2 miles southeastward of the village. Anchorage may be had off the beach near the head of *Kólpos Zavérðhas* in a depth of 10 fathoms, mud.

About $2\frac{3}{4}$ miles southwestward of the head of *Kólpos Zavérðhas* a group of rocky islets, *Nisiópoula* (*Poghonía*), lie close offshore.

Ákra Varkó, about $\frac{3}{4}$ mile farther southwestward, has *Órmos Varkó* situated immediately on its northwestern side with a sandy beach at its head. Small vessels with local knowledge can find anchorage in the northeastern part of *Órmos Varkó* in a depth of about 5 fathoms, sheltered from southeasterly winds.

Nísí Ayios Nikólaos, 67 feet high, lies about $\frac{1}{2}$ mile southwestward of *Ákra Varkó*. The islet is bordered by a bank with less than 6 fathoms over it.

Ákra Parathíra, about 1 mile west-southwestward of *Ákra Varkó*, has *Órmos Vathiá Aváli* immediately northwestward of it.

Ákra Kefáli ($38^{\circ}45' N.$, $20^{\circ}45' E.$), about $\frac{3}{4}$ mile westward of *Ákra Parathíra*, is the southeastern entrance point of *Órmos Dhrepánou*. It is 35 feet high, bold and fringed by sunken rocks. A light is shown on *Ákra Kefáli*.

Miaouli (*Miaulis*) Reef, with a least depth of $1\frac{1}{2}$ fathoms, lies about $\frac{1}{2}$ mile offshore in a position southeastward of *Ákra Kefáli*.

Órmos Dhrepánou has *Ákra Maíménos*, $1\frac{3}{4}$ miles southwestward of *Ákra Kefáli*, as its western entrance point. On the western side of the bay the coast is fringed by a narrow shallow bank, which is rocky for a distance of about $1\frac{1}{4}$ miles northward of *Ákra Maíménos*. The general depths in the bay decrease gradually from about 35 fathoms at its entrance to about $4\frac{1}{4}$ fathoms at its head.

8C-10 *Nísí Voliós*, 16 feet high, lies close off the eastern entrance of *Levkas Canal*. A light is shown from *Nísí Voliós*. conspicuous fortress stands on the summit of a hill about $\frac{1}{4}$ mile eastward of *Nísí Voliós*. There is anchorage at the head of the bay southwestward of the fortress in depths of 45 feet, good holding ground. The inner

ANCHORAGE extends about 400 yards northward from the submerged mole, on the western side of the entrance to Levkas Channel, and has depths of from 13 to 15 feet.

LEVKAS CANAL

Position: 38° 49' N., 20° 44' E.
Depths: Southern approach, 25 feet.
 Anchorages, 13 feet to 10 fathoms.
 In canal, 14 feet.
 Anchorage, Levkas harbor, 18 feet.
 At quay, 10 to 13 feet.
 Northern approach, 22 feet.

8C-11 LEVKAS CANAL is about 3 1/2 miles long, nearly 100 feet wide, and has a depth of 14 feet. Vessels bound for Stenon Prevezis from Patraikos Kolpos or the western side of Peloponnisos can save about 12 miles by using the canal. Vessels with a maximum draft of 13 feet can make the transit.

PILOTAGE is compulsory for merchant vessels but not for naval craft. Pilots will meet incoming vessels about 1/2 mile off either entrance of the canal and will take ships through at night.

NAVIGATION.—Vessels bound for Stenon Prevezis from the Levkas Canal may steer a course of 360° for 5 miles from the northern entrance of the canal to a position close westward of the **LIGHTED SEA BUOY** off Stenon Prevezis. This course leads over depths of not less than 7 fathoms.

Vessels bound for ports in the Adriatic Sea on an offshore track may, after clearing the northern entrance of the canal, steer a course of 304° for about 28 miles to a position with the light structure on Akra Ovorou bearing 036°, distant 2 miles; thence a course of 314° for about 59 miles leads to a position about 3 1/2 miles southwestward of Nisos Othonoi. These courses lead over depths of not less than 7 fathoms.

Vessels bound for Kerkira, by way of Notios Stenon Kerkiras or using the inshore track to the Adriatic Sea through Vorios Stenon Kerkiras may, after clearing the northern entrance of the canal, steer a course of 324° for a distance of 63 miles to a position with the summit of Nisis Vidho bearing

180°, distant about 2 1/2 miles; thence a course of 020° for about 7 1/4 miles leads to a position with the light structure on Nisis Peristerai bearing 261°, distant about 1 mile. From thereon a course of 315° for about 7 miles passes about 2 1/4 miles southwestward of Kep i Kefali. These courses lead over depths of not less than 7 fathoms.

WINDS AND CURRENTS.—Land and sea breezes are very regular in the summer, the former being felt from late evening until early morning and the latter setting in from late morning until the early evening, with calms during the intervening periods. Frequent thunderstorms occur, especially around the time of the quinoxes, when heavy squalls may be expected from the hills and mountains.

In winter, the prevalent wind is from the northward; heavy rains and strong winds occur in this season. In summer, winds are mostly from the westward to southwestward.

The depths in the canal decrease with northerly winds and increase with southerly winds to the extent of about 1 foot. The current in the canal is also dependent on the wind, the velocity varying from 1/2 to 1 1/2 knots, the latter velocity occurring with southerly winds.

NAVIGATIONAL AIDS—LANDMARKS.—The channel is marked by posts surmounted by triangular reflectors; a search light is indispensable for passage by night. The southern entrance, about 60 yards wide, is marked by light buoys; other light buoys mark the channel for about 3/4 mile northward of the southern entrance. A submerged mole, with depths of 5 feet over it, extends eastward from the coast to within about 100 yards of the light buoy marking the western side of this entrance. A rock, with depths of less than 6 feet over it, lies close southeastward of the light buoy marking the eastern side of this entrance. An old fort stands on an islet situated on the eastern side of the eastern side of the canal in a position about 1/2 mile northward of the light structure on Nisis Volios. A white spherical buoy is moored about 317 yards 357° from the old fort mentioned above, and a similar buoy is moored about 613 yards 343° from the same fort.

On the western side of the canal, about 1/2

mile northward of the southwestern entrance buoy, is a red-roofed hut with a BEACON close eastward of it. Between the two salterns, situated on the western side of the channel, there is a swamp covered with weed, in the middle of which stands Ayios Konstandinos (St. Constantinos) Fort, which is conspicuous.

HARBOR.—The harbor of Levkas is a triangular-shaped basin, about 300 yards wide, with a quay on the southwestern side having 10 to 13 feet alongside. A 1 1/2-ton crane is located on this quay. Water can be obtained in winter, in limited amounts, but none in summer. The town has telephone and telegraph facilities and coastal steamers call frequently. The customhouse and health office are situated southward of the quay. There is a small hospital that will accept seamen. Small vessels can ANCHOR off the town in a depth of about 3 fathoms. Anchoring in any part of the canal is prohibited.

THE NORTHERN ENTRANCE OF THE CANAL has a ruined citadel standing on the southwestern extremity of the narrow peninsula that forms the northeastern entrance point of the canal. A LIGHT is shown from the citadel. A rocky bank extends about 100 yards northward of the citadel and is marked by three barrel buoys on its northwestern and northern sides. The northwestern entrance point of the canal consists of a breakwater mole extending from the eastern extremity of the L-shaped peninsula on the northern side of Nisos Levkas. A LIGHT is shown from the mole. A shoal bank extends about 100 yards eastward of the mole. A floating bridge, operated by a wire cable, crosses the canal abreast the citadel. The wire cable is sunk on a vessel's approach, notice of which should be given by whistle or siren. A quay, with depths of 8 to 13 feet alongside for a length of about 150 feet, is located on the eastern side of the entrance abreast the citadel.

NOTE.—It was reported (1963) that the area at the northern entrance of the canal is continually silting.

During the summer months with fine weather, vessels may anchor off the northern entrance of Levkas Canal in a position

about 1/2 mile northeastward of the citadel in a depth of about 5 1/2 fathoms. Large vessels should anchor farther out in depths of 9 to 10 fathoms. This anchorage is exposed to northerly and northwesterly winds which cause a heavy sea.

The southern entrance of the canal affords a good anchorage on the western side of the entrance about 150 yards offshore in a depth of about 7 fathoms, over mud and weeds in good holding ground.

ANCHORAGES

8C-12 LIMIN PETALAS.—See section 8C-5.

ORMOS PLATTYIALI.—See section 8C-7.

KOLPOS ASTAKOU.—See section 8C-7.

ORMOS VOUREKOS.—See section 8C-8.

ORMOS MITIKA.—See section 8C-8.

KALAMOS.—See section 8C-8.

KOLPOS ZAVERDHAS.—See section 8C-9.

ORMOS VARKO.—See section 8C-9.

ORMOS DHEPANOU.—See section 8C-9.

SOUTHERN ENTRANCE, LEVKAS CANAL.—See section 8C-10.

LEVKAS.—See section 8C-11.

NORTHERN ENTRANCE, LEVKAS CANAL.—See sections 8C-10 and 8C-11.

PART D. STENON PREVEZIS AND AMVRAKIKOS KOLPOS

COAST—GENERAL

8D-1 AMVRAKIKOS KOLPOS (Gulf Of Arta), an extensive landlocked body of water nearly 20 miles long is entered through Stenon Prevezis, a narrow shallow passage, the seaward entrance of which lies about 5 miles north-northeastward of the northern extremity of Nisos Levkas. A buoyed dredged channel leads through Stenon Prevezis to the town and harbor of Preveza, situated on the western side of Ormos Prevezis at the inner part of the passage.

The shoreline of Amvrakikos Kolpos is very irregular, being indented by numerous coves and small bays. The southern and eastern sides of the gulf are fairly steep-to, but its northern shore is an irregular stretch of swamp, marsh and lagoon, in many places

only separated from the gulf by a narrow strip of sand and mud, which in winter is overflowed.

There are several villages situated along the shores of the gulf, most of which are only of local importance.

DEPTHS—DANGERS

8D-2 In 1962 there was a depth of 17 feet in the buoyed channel over the bar. This channel, about 1 mile long and 140 feet wide, leads in a east-northeasterly direction across the bar into depths of more than 6 fathoms.

A 16-foot patch lies in the channel and on the 066° range line, in a position nearly 1½ miles west-southwestward of the front range light. A 3-fathom patch lies close southward of the above-mentioned 17-foot patch.

There are general depths of from 5 to 15 fathoms in Órmos Prevéza but shoal water, with depths of less than 3 fathoms, extends from the shore northward of the town for a distance of nearly ½ mile. The depths all along the northern shore are very irregular and sounding is the only guide when in its vicinity.

The several dangers in the gulf are described with the area in which they are situated.

NAVIGATION

8D-3 Vessels bound to ports in the Adriatic Sea from Sténon Prevézis may steer a course of 234° for about 26 miles from the seaward entrance of the channel to a position with the light structure on Ákra Ovorouí bearing 036°, distant about 2 miles; thence a course of 314° for about 94 miles leads to a position in the Strait of Otranto about 16 miles east-northeastward of Capo d'Otranto.

Vessels bound for Kérkira by way of Nótios Sténon Kérkiras, or using this inshore track to the Adriatic Sea through Vórios Sténon Kérkiras, may steer a course of 319° for about 37 miles from the seaward entrance of Sténon Prevézis to a position with the light structure on Nisis Sívota bearing 053°, distant 1 mile. Then a course of 324° for

about 21 miles leads to a position with the light structure on Nisis Vídho bearing 180°, distant about 2¾ miles; thence a course of 020° for a distance of about 7¼ miles leads to a position with the light structure on Nisis Peristeraí bearing 261°, distant about 1 mile. From thereon a course of 315° for a distance of about 7 miles passes about 2¼ miles southwestward of Kep i Kefali. These courses lead over depths of not less than 10 fathoms.

Vessels bound for Patraikós Kólpos or for ports in the southwestern part of Greece can follow the reverse of the tracks described in sections 8B-3, 8C-4, and 8C-11.

TIDAL CURRENTS

8D-4 The current in the channel of Sténon Prevézis, though mainly tidal, is irregular and strong. The ebb current when accompanied by a northerly wind sometimes attains a velocity of 3½ knots. The current sets approximately eastward and westward at the western end of the channel, and north-northeasterly and south-southwesterly at the eastern end. Therefore a vessel entering the channel with the current on the port side will leave the channel with it on the starboard side, and vice versa. The current sets along the axis of the central part of the channel.

WINDS AND WEATHER

8D-5 During the summer it is hot and dry. Westerly winds spring up about noon and continue until sunset, but during the night at this season it is generally calm.

Westerly winds, accompanied by rain, are prevalent during the winter and predominant during the months of October to January. Wind of gale force is preceded by dense dark clouds over the mountains of Nisos Levkás. It usually commences in the south-southwest and ends in the northwest, after which it backs to the west and dies down. Easterly winds, accompanied by cold with snow and rain, are predominant during the months of January to March. An east wind usually lasts about three days with an overcast sky and, after clearing, continues very strong

for an additional two or three days. Easterly gales may follow each other in rapid succession.

Rain squalls in April are preceded by heavy white cumulus clouds in the north.

Préveza is well protected from westerly winds. Shelter from easterly winds can be had in the lee of Ákra Laskára or the Aktion Peninsula.

COASTAL FEATURES—LANDMARKS

8D-6 The entrance points of Sténon Prévézis are Ákra Skílla, a low promontory situated about $4\frac{3}{4}$ miles north-northeastward of the northern entrance to Levkas Canal, and Fort Pandokrátor, which stands in ruins on a point situated about $1\frac{1}{4}$ miles north-northwestward of Ákra Skílla.

8D-7 Navigational Aids.—Range lights are shown on the shore about $1\frac{1}{2}$ miles northeastward of Ákra Skílla. In range 066° they lead through the dredged channel of Sténon Prévézis.

The light buoy marking the seaward entrance of the channel is moored on the range line about 1 mile southwestward of Fort Pandokrátor, and the channel itself is marked by three pairs of light buoys.

A light is shown on Ákra Ákri, the north-western extremity of the peninsula forming the eastern side of Órmos Prévézis.

A light is shown on the quay at Préveza.

A light is shown on the southeastern extremity of the shoal that extends in an easterly direction from the shore northward of the town.

A buoy is moored about 600 yards westward of the front range light and marks the outer edge of the shore bank.

Pilotage is compulsory for merchant vessels. The pilot will meet incoming vessels about 1 mile seaward of the outer entrance buoy.

Landmark.—A mast stands on Ákra Paliosáraga ($38^{\circ}57'N.$; $20^{\circ}46.5'E.$).

Submarine cable.—A submarine cable extends from Ákra Paliosáraga to a position about 200 yards northward of the front light of the range leading through Sténon Prévézis.

Anchorage.—Vessels waiting for a pilot may anchor about 1 mile southwestward of Fort Pandokrátor in depths of 8 to 9 fathoms. Larger vessels or those intending to remain for any length of time should anchor farther out in a depth of about 11 fathoms, mud bottom.

In Órmos Prévézis the best anchorage is about $\frac{1}{4}$ mile off the center of the town in a depth of 7 fathoms, mud bottom.

A mooring buoy is located in the north-western part of Órmos Prévézis.

Prohibited anchorages.—Anchorage is prohibited in an area about 200 yards on either side of a line extending on a bearing of about 135° from Ákra Paliosáraga. Anchorage is also prohibited within 55 yards of the mooring buoys.

8D-8 Directions.—Vessels entering Sténon Prévézis should keep precisely on the range in order to benefit by the greatest depth in the channel. Currents run strongly through it. When departing from the range head north-northeastward until abeam of Ákra Paliosáraga, thence proceed to the anchorage.

8D-9 Preveza ($38^{\circ}57'N.$, $20^{\circ}45'E.$), a town situated on the western side of the inner part of Sténon Prévézis, had a population of about 11,000 in 1951.

North Quay has a berthing length of 650 feet with $3\frac{1}{2}$ to 13 feet alongside.

Control Quay has a berthing length of 1,750 feet with 6 to 28 feet alongside.

South Quay has a berthing length of 910 feet with 5 to $6\frac{1}{2}$ feet alongside.

A detached breakwater protects North Quay.

The port has one shore crane with $2\frac{1}{2}$ tons capacity.

A few fresh provisions are obtainable. Potable water is supplied by barge from Vonitsa and is available in limited quantities. The town water supply is considered unsafe for drinking.

Small quantities of diesel oil and gasoline can be supplied in drums.

COASTAL FEATURES—LANDMARKS (Continued)

8D-10 The entrance.—Amvrakikós Kólpos lies between Ákra Ákri and the southeastern extremity of the shoal water extending in an easterly direction from the shore northward of Préveza.

The southern extremity of the shoal on the northern side of the entrance and the extremity of the shoal extending eastward from Ákra Ákri are each marked by a buoy.

Órmos Vathy, a small bay, is entered about 1 mile northward of Órmos Prevézis. A conspicuous factory is located on the southwestern shore. A pier and a quay are close northward of the factory.

The western end of the gulf is somewhat divided by a large peninsula that extends in an east-southeasterly direction from the shore, northward of Préveza, for a distance of about 4 miles. A light is shown on Ákra Laskára, the southeastern extremity of this peninsula.

The main part of the gulf is entered between Ákra Laskára and Ákra Panayía, the termination of a bold steep tongue of land situated about 2 miles eastward. A light is shown on Ákra Panayía.

Órmos Vonítsis, which indents the southern side of the gulf to a distance of about 2 miles, is entered between Ákra Panayía and Ákra Yeládha, about $2\frac{3}{4}$ miles east-southeastward.

Nísís Kéfalos, a triangular-shaped islet fringed by shoal water, lies about $\frac{1}{2}$ mile north-northeastward of Ákra Yeládha. Vessels approaching Órmos Vonítsis from the westward should pass northward of this islet.

Vónitsa, a town situated at the head of Órmos Vonítsis, has telegraph and medical facilities. A light is shown from the head of a mole at Vónitsa.

Kólpos Loutrakíou, the largest indentation in the southern shore of Amvrakikós Kólpos, is entered between Ákra Khalíki, a low cape situated about 5 miles east-southeastward of Ákra Yeládha, and Ákra Makriamíti, about 4 miles farther east-southeastward. The depths in this body of water are great, but anchorage may be had in the entrance to Órmos Paliomflou, a cove near the middle of its western side and off the village of Loutráki, located near the head of the gulf. Ifalos Aléxandros, consisting of an isolated $3\frac{1}{4}$ -fathom patch, lies off the entrance to Kólpos Loutrakíou in a position about 2 miles east-northeastward of Ákra Khalíki.

Órmos Karvasará, a long narrow bay that indents the most easterly part of the southern shore of Amvrakikós Kólpos nearly 4 miles, is entered between Ákra Dervisa, situated about $\frac{1}{2}$ mile eastward of Ákra Makriamíti, and a point on the eastern coast of the gulf situated about $1\frac{1}{2}$ miles northeastward. A light is shown on Ákra Dervisa. A light is shown on Ákra Ayios Yéoryios, on the western side of the bay about 2 miles southeastward of Ákra Dervisa.

The northern part of the eastern side of Órmos Karvasará is fronted by a shore bank extending up to 600 yards offshore in places. The town of Amfilokhía, situated at the head of the bay, has telephone and telegraph facilities.

Órmos Salaóras is situated at the northwestern end of Amvrakikós Kólpos and is entered between Ákra Mirtávi, located about 1 mile northward of Ákra Laskára, and Ákra Salaóra, the southern extremity of an island-like 272-foot peninsula situated about $4\frac{1}{2}$ miles northward of Ákra Yeládha. A light is shown on Ákra Salaóra. Anchorage may be had in depths of $3\frac{1}{2}$ to 4 fathoms about $\frac{3}{4}$ mile southward of the light structure on Ákra Salaóra. From a position about $1\frac{1}{4}$ miles westward of the light, depths of less than 4 fathoms extend $1\frac{1}{2}$ miles offshore; a detached shoal, with a depth of $2\frac{3}{4}$

fathoms, over it, lies about $1\frac{3}{4}$ miles southward of the light. The mouth of a large stream is situated at the head of Órmos Sálaóras and a coastal bank, with less than 2 fathoms over it, extends about 1 mile east-southeastward from the mouth. A light is shown on the southern side of the stream's mouth.

Eastward of Akra Salaóra a narrow sandy beach extends about 3 miles southeastward from the cape and thence northeastward for about 2 miles, separating Amvrakikós Kolpós from a shallow lagoon. The coastal bank, with depths of less than 2 fathoms, is about 800 yards wide off this beach, but extends about $1\frac{1}{4}$ miles from its southern end. The Nisídhēs Kórakas, six in number, lie on the bank southward of the southern extremity of the beach. Nisís Voúvalos, the largest and southernmost of the islets, is situated on the southern edge of the bank about $2\frac{1}{4}$ miles northeastward of Nisís Kéfalos. A detached $4\frac{1}{4}$ -fathom patch lies about $\frac{1}{8}$ mile southward of Nisís Voúvalos.

Akra Palmateró, a low projection, lies about $3\frac{1}{4}$ miles east-northeastward of Nisís Voúvalos. A shallow spit, which dries in places, extends south-southeastward from this point for a distance of about $1\frac{3}{4}$ miles. A light buoy marks the southern extremity of this spit.

The mouth of the Potamós Arakhthos, about $3\frac{1}{2}$ miles eastward of Cape Palmateró, discharges at the extremity of two arms of a low projection extending in an east-southeasterly direction from the coast. A shallow bank, parts of which dry, extend about 1,200 yards southward and 500 yards eastward from the mouth.

Akra Kópraina, about $1\frac{3}{4}$ miles northeastward of the mouth of the Potamós Arakhthos, is a peninsula through which a river discharges into the gulf. A light is shown from Akra Kópraina. Órmos Kóprainis, located immediately eastward of the cape, has the village of Kópraina in the

northwestern part of the head of the bay. Anchorage may be had in about 9 fathoms off the village with the light structure on Akra Kópraina bearing about 234° , distant $\frac{3}{4}$ mile.

The coast for about 3 miles south-southeastward of Órmos Kópraina is steep-to and mountainous immediately inland. Farther southward for about $2\frac{1}{2}$ miles, the coast is low and fringed by a shallow bank.

ANCHORAGES

8D-11 Préveza.—See section 8D-7.

Órmos Vonitsis.—About 1 mile northward of the town in depths of 7 to 8 fathoms.

Kólpos Loutrakíou.—See section 8D-10.

Akra Salaóra.—See section 8D-10.

Órmos Kóprainis.—See section 8D-10.

PART E. STÉNON PREVÉZIS TO KEP I KEFALI, INCLUDING KÉRKIRA AND OUTLYING ISLANDS

COAST—GENERAL

8E-1 The coast from Sténon Prevézis trends quite regularly in a general northwesterly direction for about 38 miles to Nisos Sívota. This part of the coast is backed by moderately high mountains with Óros Topolia, 2,785 feet high, about 6 miles northward of Akra Kastrosikia, and Oros Zalingon, 2,536 feet high, about 4 miles northwestward of Akra Kastrosikia. Nisos Paxoi and Nisos Andipaxoi lie about 8 and 9 miles respectively off this section of the coast.

Nisos Kérkira, the most important of the Ionian Islands and the second largest, lies a short distance off the mainland near the boundary of Greece and Albania with Akra Asprókavos, its southern extremity, in a position about 38 miles northwestward of Sténon Prevézis. This island has a length of about 33 miles and a greatest width of about 15 miles at its northern part. Nisos Kérkira is extremely mountainous throughout its

area and has Óros Pandokrátor, its 3,000-foot summit, attaining that elevation in the northeastern part of the island. It is very irregular in shape with many coastal indentations. Numerous small islands and islets lie off its shores.

The coast of the mainland from abreast Nísos Sívota to Kep i Kefali, 33 miles north-northwestward, is very irregular with deep coastal indentations. This section of the mainland is predominantly mountainous, but areas of cultivated coastal plain extend inland for some distance at frequent intervals.

Sténon Kérkiras, the channel separating the eastern coast of Nísos Kérkira from the mainland, is approximately 35 miles long with a width that varies from about 1 mile near its northern entrance to over 13 miles at its center. The southern part of the channel, Nótios Sténon Kérkiras, is entered between Ákra Asprókavos and Nísos Sívota. The northern part of the channel, Vórios Sténon Kérkiras, is entered between Ákra Ayía Aikateríni, the northern extremity of the island, and Kep i Kefali. The town and harbor of Kérkira lie on the western side of the channel near the central part of Nísos Kérkira.

Caution.—Navigation is prohibited in an area enclosed by a line drawn from Ayía Aikateríni (sec. 8E-8) in a 047° direction for $\frac{1}{2}$ mile, thence 115° for $4\frac{1}{4}$ miles, thence 144° for $1\frac{1}{2}$ miles, thence 206° for $2\frac{1}{4}$ miles, thence 280° for $4\frac{1}{4}$ miles, thence 305° to the shore.

Vessels are prohibited from approaching Nísos Vídho.

See section 1-24 concerning danger areas.

DEPTHS — DANGERS — OFF-LYING ISLANDS

8E-2 All dangers along the coast of the mainland and that of the off-lying islands are contained within the 10-fathom curve which is nowhere more than 3 miles offshore.

There are a number of detached dangers lying within the confined area of Sténon Kérkiras which are described with that area. Numerous other shoals and islets will also be included in the description of the particular coastal section in which they lie.

Sténon Kérkiras has general midchannel depths of 30 to 35 fathoms.

NAVIGATION

8E-3 From a position on the coastal track $31\frac{1}{2}$ miles southwestward of Ákra Yerogómbos a course of 003° for about 60 miles leads to a position about 4 miles eastward of the light structure on Ákra Ovorouí. From this position a course of 336° for about 17 miles leads to a position about 1 mile west-southwestward of Nísos Sívota, where a course of 322° may be steered to a position off the town of Kerkira. These courses lead over depths of not less than 34 fathoms and pass about 2 miles eastward of Panayia (Madonna) Reef and about $2\frac{1}{4}$ miles eastward of the closest 4-fathom patch on Asprokavos (Bianco) Shoal.

Vessels from the Levkas Canal or Sténon Prevézis bound for Kérkira, or the Adriatic Sea on the inshore track, see section 8C-11 and section 8D-3.

WIND AND CURRENT

8E-4 Southeasterly and southwesterly winds, accompanied by dense clouds and heavy rain, are common in Sténon Kérkiras during the winter months. Strong northerly and northwesterly winds sometimes occur during these months but are of short duration. Light breezes generally prevail during the summer months.

A current, the direction and velocity depending largely on the wind, sets through the narrow part of the northern entrance of Sténon Kérkiras. During strong winds the current may attain a velocity of $1\frac{1}{2}$ to 2 knots.

COASTAL FEATURES—LANDMARKS

8E-5 Between Fort Pandokrátor ($38^{\circ}57'N.$, $20^{\circ}44'E.$) (sec. 8D-6) and Akra Mítika, situated about 4 miles north-northwestward, the coast is cliffy with a sandy beach and fringed by a shallow coastal bank with submerged rocks, extending at most about 600 yards offshore. A bank, with about $1\frac{1}{2}$ fathoms over its steep-to outer end, extends about $\frac{3}{4}$ mile westward of the cape. A light is shown on Akra Mítika.

Akra Kastrosikía, about $6\frac{1}{4}$ miles north-northwestward of Akra Mítika, is a low red projection having a steep-to rocky ledge extending about $\frac{3}{4}$ mile southwestward and southward from the cape. Itíssa Reef, partly awash, lies at the southern end of the ledge. An islet lies near the outer edge of the ledge south-southwestward of the cape, and a rock lies awash about $\frac{1}{2}$ mile northwestward of the islet. A wreck lies about 10 miles northwestward of Akra Kastrosikía.

Órmos Fanári (Port Phanari), about $11\frac{1}{2}$ miles northwestward of Akra Kastrosikía, has a conspicuous castle in ruins situated about $2\frac{1}{2}$ miles eastward of the harbor entrance. There is temporary anchorage during the summer in a depth of 10 fathoms about 600 yards southwestward of the entrance. Due to silting, the harbor is no longer a satisfactory anchorage for vessels of moderate size.

Órmos Ayiou Ioánnou (Port San Giovanni), about 2 miles northward of Órmos Fanári, indents the coast for about $\frac{2}{3}$ mile. With northerly winds the best anchorage is in the middle of the harbor in a depth of about 13 fathoms, mud.

Limín Párgas (Port Parga), about $3\frac{1}{2}$ miles westward of Órmos Ayiou Ioánnou, is divided into two bays by a conical rocky projection, 263 feet high, on which stands Párga fortress and behind which is the town of Párga. Anchorage for small vessels may be had in a depth of 7 fathoms, mud, in a position west-southwestward of the structure on the fortress from which a light is shown. A 7-foot shoal lies about 250 yards west-northwestward of the light structure. During fine summer weather a vessel may

find temporary anchorage off Parga harbor in depths of about 20 fathoms, mud, with Akra Ayios Spiridhonos, the western entrance point of the harbor, bearing 284° . It is impossible to enter the port with strong northerly winds. The town has a population of about 1,700. The harbor has depths of 16 feet. A pier extends about 225 feet from the shore of the bay close eastward of the town of Parga. Limited supplies of water are available. The town has telephone and telegraph facilities.

Akra Ayios Spiridhonos ($39^{\circ}17'N.$, $20^{\circ}23'E.$) is 173 feet high, steep and rugged; close northwestward is a monastery with a conspicuous belfry. Vrakhoi Spiridhonía, rocks awash, lie about 100 feet southeastward of the cape. An islet and rocks awash lie close southwestward of the cape.

8E-6 Nisos Paxoi, 755 feet high and about $5\frac{1}{2}$ miles long, is situated about 10 miles west-southwestward of Akra Keladhío. There are several islets lying close offshore, and Marmára Reef, on which there are several above-water rocks, extends nearly $\frac{1}{4}$ mile northwestward from the northwestern extremity of the island. A conspicuous radio mast stands about $2\frac{1}{2}$ miles south-southeastward of this extremity. A light is shown from the northwestern extremity of the island. Panayía (Madonna) Reef, the shoalest head of which sometimes dries, lies from 2 to $2\frac{3}{4}$ miles eastward of Nísís Panayía, which lies eastward of the southern half of the Nisos Paxoi. A light is shown on Nísís Panayía. Paxoi Reef, with a depth of less than 1 fathom, lies about $\frac{1}{2}$ mile off the eastern side of the northern half of Nisos Paxoi in a position about $1\frac{3}{4}$ miles northwestward of the light structure on Nísís Panayía. Two islets lie eastward of the southeastern extremity of Nisos Paxoi. Gaios (Paxoi) on the eastern side of the island, is the principal town.

Nisos Andípaxoi, about $1\frac{3}{4}$ miles long, lies southeastward of Nisos Paxoi and is separated from it by a deep channel about 1 mile wide. Depths shoaler than charted were reported (1945) to exist in the middle of this passage about 1,200 yards northwestward of the northern extremity of Nisos Andípaxoi. The island is generally level, but rises near its northern end to an elevation of

387 feet. Its coast is fringed by a narrow bank with a few rocks lying close offshore. At the northern end of the island the coastal bank is about 400 yards wide and has a depth of about 3.6m (2 fm).

A light is shown on Akra Ovorou, the southeastern extremity of Nisos Andipaxoi.

Nisoi Dhaskalia (Vascaglia Plakka), a group of small rocky islets and a number of rocks, lie nearly 1 mile southward of the light structure on Akra Ovorou. A rock lies midway between Nisoi Dhaskalia and Akra Ovorou.

8E-7 Nisos Kerkira (Corfu) has Akra Asprokavos (Cape Bianco), its southeastern extremity, situated about $7\frac{1}{4}$ miles northward of the northernmost point of Nisos Paxoi. The southern half of the channel between these islands is deep and free of dangers, but the northern part is obstructed by Asprokavos (Bianco) Shoal, which extends about $4\frac{1}{2}$ miles southeastward from Akra Asprokavos and has irregular depths. There are 7.3m (4 fm) patches which extend about $1\frac{3}{4}$ miles southeastward from the cape and other up to 2 miles east-northeastward. A 2.8m (1 $\frac{1}{2}$ -fm) patch lies about $\frac{3}{4}$ mile southwestward of the cape. Akra Asprokavos is about 330 feet high, composed of white cliffs, and fringed by a shallow rocky bank. Depths shoaler than charted were reported (1945) to exist about 4 miles east-southeastward of Akra Asprokavos.

The western coast of Nisos Kerkira from Akra Asprokavos to Akra Falakron, about 28 miles northwestward, is of little importance to shipping. There are few landmarks and anchorages only for small craft with local knowledge. A number of shoals, islets, and rocks lie off this part of the coast. Akra Falakron is conspicuous for its steep rugged cliffs and a fortress in ruins standing on a hill about $\frac{1}{4}$ mile northeast of it.

A light is shown on Laguida Rocks about

10 miles west-northwestward of Akra Asprokavos.

Ormos Liapadhon is a small bay in which vessels occasionally anchor during northerly or easterly winds in depths of about 18.3m (10 fm), fine sand. It is entered about 2 miles southeastward of Akra Falakron. A 3.6m (2-fm) patch lies $\frac{1}{4}$ mile northwestward of the eastern entrance point of the bay. A light is shown on Akra Kosteri, the northwestern entrance point of Ormos Liapadhon.

Ormos Ayios Yeoryios (St. George's Bay), in the northwestern part of which there is good anchorage during the summer months, is entered between Akra Falakron and Akra Arilla, about 2 miles north-northwestward. The southeastern side of the bay is foul up to $\frac{1}{4}$ mile offshore. The best anchorage is in the northern part of the bay in depths of 10.9m (6 fm) to 14.6m (8 fm), sand, but it is exposed to southwesterly winds. A light is shown on Akra Arilla, a bold point, 298 feet high, which is the termination of a narrow peninsula that projects in a south-southwesterly direction from the shore for nearly 1 mile.

The northwestern coast of Nisos Kerkira from Akra Arilla to Akra Dhrastis, situated about $5\frac{1}{2}$ miles northward, is fronted by several islets and rocks and numerous shoal patches that lie between it and Nisos Samothraki, an island about 6 miles northwestward of Akra Arilla.

8E-8 Nisos Samothraki ($39^{\circ}46' N.$, $20^{\circ}33' E.$) is about 2 miles long, 500 feet high, and fringed to a distance of about $\frac{1}{2}$ mile by above-water and sunken rocks. An islet lies about $\frac{3}{4}$ mile off its western side and a detached 3.2m (1 $\frac{3}{4}$ fm) shoal lies about 2 miles northwestward of Nisos Samothraki. Vessels without local knowledge should not attempt to pass between Nisos Samothraki and the northwestern coast of Nisos Kerkira.

Nisos Othonoi and Nisos Erioussa, the northernmost of the Ionian Islands, lie re-

spectively about $5\frac{1}{2}$ miles northwestward and about the same distance north-northeastward of Nisos Samothráki. Nisos Othonoi, the larger of the two, has its 1,289-foot summit at its southwestern part and another peak 1,084 feet high near its northwestern extremity, giving it a forked appearance when viewed from the westward. Both islands are fairly steep-to, the 10-fathom curve lying no more than $\frac{1}{2}$ mile off either island. Petamopoli Light is shown on the northeastern side of Nisos Erikousa. A stranded wreck lies on the northwestern shore of Nisos Erikousa. Aspri Petra (Osprey Rock), a steep-to rock with a depth of 1.8m (1 fm), lies off the southern side of Nisos Othonoi in a position about $\frac{1}{2}$ mile southwestward of Akra Avlaki, its southeastern extremity. Akra Kastri, the northeastern extremity of the island, is fringed by several sunken and above-water rocks, and there are several dangerous detached shoals lying within a radius of 1 mile of this point. A light is shown on Akra Kastri and on the southern extremity of Nisos Othonoi. The channels between Nisos Othonoi and Nisos Erikousa and between Nisos Othonoi and Nisos Samothraki are wide and deep, the only dangers being the 3.6m (2 fm) patch off the northern extremity of Nisos Samothraki and the detached shoals in the vicinity of Akra Kastri. A bank with a depth of 12m (1 $\frac{1}{2}$ fm) exists about 2 $\frac{1}{4}$ miles north-northeastward of the light.

The northern coast of Nisos Kérkira from Akra Dhrástis to Akra Ayía Aikateríni, about 8 miles east-northeastward, is generally low, sandy, and fronted to a distance of about $\frac{1}{2}$ mile by sand shoals and rocks. Astrakari Reef with depth of less than 1.8m (6 ft.) lies about 1 mile offshore approximately 3 $\frac{1}{2}$ miles east-northeastward of Akra Dhrastis. Akra Ayía Aikateríni, the northern extremity of Nisos Kérkira, is about 200 feet high and can be recognized by a conspicuous church standing on its summit.

8E-9 Nótios Sténon Kérkiras (South Corfu Strait) is entered between Akra Asprókavos and Nisos Sívota, a small island lying close off the mainland about 5 miles east-northeastward. A light is shown near the northwestern extremity of Nisos Sívota.

The western approach to the channel is obstructed by Asprókavos Shoal (sec. 8E-7), but the eastern half of Nótios Sténon Kérkiras has general depths of about 55m (30 fm) to 73m (40 fm).

The western side of Nótios Sténon Kérkiras between Akra Asprókavos and Akra Levkímmi, about 6 miles north-northwestward, is fronted to a distance of about $\frac{1}{2}$ mile by foul ground with depths of not over 5.5m (3 fm). Akra Levkímmi is a low sandy tongue of land that projects nearly 1 mile in a north-northeasterly direction from the eastern coast of Nisos Kérkira. A light is shown on Akra Levkímmi. Between Akra Levkímmi and Akra Sídhero, about 12 miles north-northwestward (sec. 8E-10), the coast recedes in a long bight with no off-lying dangers.

Órmos Levkímmi lies immediately westward of Akra Levkímmi. Excellent anchorage will be found in this bay in depths of 28m (15 fm) to 31m (17 fm) with the light on Akra Levkímmi bearing 081° and the light structure on Nisos Sívota bearing 109°. Anchorage may also be had in the bay eastward of Akra Voukari (Buccari), about 3 $\frac{1}{4}$ miles westward of Akra Levkímmi, in depths of 18.3m (10 fm), sand. A light is shown from the head of the breakwater located in the southern part of Órmos Levkímmi.

Submarine cable—A submarine cable extends from a position, 1.1 miles, southeastward from Akra Levkímmi in a northeastward direction to the opposite shore. Anchoring within 400 yards (336m) of the cable is prohibited.

The village of Mesongí (Mirangi) lies about 3 miles west-northwestward of Akra Voukári. Vessels occasionally anchor off the village in depths of 14.6m (8 fm) or 16.5m (9 fm) sand.

The village of Benítsa (Benizza) lies about 4 miles north-northwestward of Mesongí. Vessels occasionally anchor off this village in a depth of about 16.5m (9 fm).

Pondikó (Ulysses), a 64-foot islet with a chapel on it, lies close offshore about 2 $\frac{1}{2}$ miles northward of Benítsa. The islet lies on the southern side of the entrance to Khalikiópoulos (Kalikiopulo) lagoon.

ORMOS GARITSA (Kastrades Bay) is entered between Akra Sidhero and Windmill Point (Akra Anemomilos), about 3/4 mile south-southwestward. A **LIGHT** is shown on the head of pier at Akra Anemomilos. Red obstruction lights are shown on two radio masts about 1 3/4 miles southwestward of Akra Sidhero. A detached 6 1/2-fathom patch lies about 1,400 yards south-southeastward of Windmill Point and about 800 yards offshore. Ormos Garitsa is shallow and used mainly by fishing boats. Garitsa, a suburb of the town of Kerkira, lies at the head of the bay. A **LIGHT** is shown on the shore east-northeastward of the town.

PROHIBITED ANCHORAGE.—Anchorage is prohibited in Ormos Garitsa northeastward of a limit indicated on the chart by a dashed line.

8E-10 AKRA SIDHERO is the eastern extremity of a rocky promontory on which the Citadel of the town of Kerkira stands. The promontory is separated from the westward part of the town by a moat in which there are depths of about 7 feet. A **LIGHT** is shown from the Citadel and a **SIGNAL STATION** is maintained. An occasional **LIGHT** is shown at the entrance of the Citadel moat. Off the northern side of the Citadel is a basin with a depth of 6 feet where small vessels can shelter; a **LIGHT** is shown on the western end of its protecting breakwater.

AKRA AYIOS NIKOLAOS lies about 800 yards west-northwestward of Akra Sidhero. The harbor of Kerkira, with the suburb of Mandouki at its head, lies between Akra Ayios Nikolaos and Akra Kefalomandoukon, about 1 1/4 miles west-northwestward.

NISOS VIDHO (Vido), 142 feet high, lies less than 3/4 mile northward of Akra Ayios Nikolaos. The island is fringed by a narrow bank and a shallow rocky ledge extends as much as 250 yards from its northwestern side. Kondilo (Kondalonisi), a group of rocks lies near the outer edge of this ledge. There is a landing pier on the southern side of the island. A **LIGHT** is shown on the southeastern extremity of Nisos Vidho and a conspicuous white stone monument stands close northward of the light structure. The monument is not conspicuous westward of a northeasterly bearing because it is obscured by trees.

Two **FOUL AREAS** extend southward of this island; the first is from the southeastern point of the island, extending about 1/2 mile south-southwestward from the light; the second extending about 1/4 mile south-southwestward from the southwestern point of the island. A mooring buoy lies nearly 1/2 mile west-northwestward of the light.

KALOYIROS (Calovero), a rock 30 feet high and surrounded by a narrow shallow bank, lies about 800 yards northwestward of the southwestern extremity of Nisos Vidho. The depths are irregular between these islands with less than 5 fathoms in places. A detached shoal, with a depth of 4 3/4 fathoms, lies about 600 yards northeastward of Kaloyiros, and another with a least depth of 5 fathoms lies about 300 yards to 800 yards west-northwestward of the rock. Only vessels of shallow draft should use the passage between Nisos Vidho and Kaloyiros.

8E-11 NISIS GOUVINON (Lazaretto), 68 feet high, lies about 1 2/3 miles west-northwestward of Nisos Vidho. There is a landing pier at the southeastern extremity of this islet. See section 8E-12.

KERKIRA

Position: 39° 37' N., 19° 56' E.
Depths: Anchorage, 12 to 16 fathoms.
 Jetty, 6 to 10 feet.
 Inner harbor, 24 feet.
Tidal rise: Negligible.

8E-12 The harbor of Kerkira (Corfu) is an open roadstead with anchorage between the town and Nisos Vidho.

NAVIGATION.—Vessels approaching Kerkira from the southward on a course of about 322° may, when the light structure on the citadel bears 270°, set course for the anchorage in the roadstead northward of the town.

Vessels bound for Kerkira from the northward through Vorios Stenon Kerkiras may approach Nisis Peristerai on a course of about 135°, passing nearly 1 mile eastward of the islet. When the light structure on Nisis Peristerai bears about 245°, distant 1 mile, a change of course to 192° may be

made. This course, for a distance of about 10 miles, leads to a position southeastward of Nisos Vidho with the light structure on the island bearing 319°, distant about 550 yards. Then a change of course to 258°, for a short distance leads to the charted anchorage in Kerkira Road.

The reverse of these courses and procedure may be used by vessels proceeding from Kerkira Road northward or southward through Stenon Kerkiras.

WIND AND WEATHER.—During the spring months the breezes are light and variable. The prevailing summer wind is northwesterly with warm days and cool nights. The southeasterly winds of December and northerlies during the winter are severe enough to stop all handling of cargo in Kerkira Road. April through June are the best months from a weather standpoint. The summer months are dry.

LANDMARKS.—There are several landmarks other than those mentioned in the approaches to Kerkira. A prominent radio tower stands about 2 1/4 miles westward of Akra Sidhero. A white tower with a large red dome is situated about 330 yards west-southwestward of Akra Ayios Nikolaos.

Kerkira Aeronautical Radiobeacon transmits from a position about 1 1/4 miles southwestward of Akra Sidhero.

HARBOR.—There are a number of small piers projecting offshore from the northern part of the town. A **LIGHT** is shown from the pier nearly 1/4 mile westward of Akra Ayios Nikolaos. Close westward of this pier is an inner detached breakwater with a light shown near its western end; an outer detached breakwater, close northwestward has its eastern end marked by a light. A breakwater extends eastward from the shore to a position about 250 yards westward of the western end of the outer detached breakwater. An entrance to the harbor area, about 250 yards wide, is formed between the light, near the western end of the inner detached breakwater, and the outer detached breakwater. Small vessels anchor and secure their sterns to the outer breakwater, where there are depths of 18 to 40 feet. The entire inner harbor has been dredged to a depth of 24 feet.

Construction of quays are in progress (1967) in the southwestern part of the harbor.

ANCHORAGE.—The roadstead northward of the town is sheltered by Nisos Vidho from the strong northeasterly winds which blow during the winter months. The best anchorage for naval vessels is in about midchannel and for best protection Kep i Skales should not be visible in this berth. Merchant vessels may anchor off the health office and customhouse, situated on the northern face of the town, in depths of from 5 to 10 fathoms. Vessels in quarantine are sent to lie off Nisis Gouvinon until they receive partique. The quarantine anchorage is about 600 yards southward of the islet in a depth of 13 fathoms. The recommended anchorage during southeasterly winds lies about 700 yards south-southwestward of the southwestern extremity of Nisos Vidho. See section 8E-11.

Two **FOUL AREAS** consisting of sunken booms are located in this anchorage. See section 8E-10.

Two **MOORING BUOYS** are positioned about 100 yards northward of the inner detached breakwater.

A conical **BUOY** lies about 320 yards east-northeastward of the light near the western end of the inner breakwater.

8E-13 PILOTAGE is compulsory for merchant vessels but not for naval vessels. Pilots board about 1 mile off Akra Sidhero. They will take vessels in at night. One long blast on the whistle is the signal used to call a pilot.

8E-14 KERKIRA (Corfu), the largest town on Nisos Kerkira and the capital of the island, extends along the shore westward and southward of Akra Sidhero. The population, in 1962, was about 32,000. Cargo is handled at the anchorage and several lighters and two small tugs are available.

New Quay, in the southeastern part of harbor, is 1,125 feet long with 20 feet alongside. Petroleum Pier on the western side of the harbor has 95 feet of usable berthing space with 10 feet alongside.

The largest marine railway can lift 70 tons. Minor repairs can be accomplished.

Fresh provisions and water are available. Water should be chlorinated. Limited supplies of fuel oil, diesel oil, and gasoline occasionally may be obtained.

There are telegraph and radio facilities. Greek coastal steamers call frequently. There is a well equipped hospital that will receive seamen.

COASTAL FEATURES (CONTINUED)

8E-15 The southeastern entrance point of ORMOS FAIAKON is located about 2 1/2 miles northwestward of Akra Kefaloman-doukon, the intervening coast being low and fringed by a narrow shallow bank. The northern entrance point of Ormos Faiakon is situated about 500 yards farther northwestward. This bay is well sheltered, but it is seldom used as shallow banks extending from both entrance points leave only a narrow channel with a least fairway depth of about 3 1/4 fathoms. Within the bay extensive mud banks fringe both sides, leaving a small area in which the depths are from 3 to 3 3/4 fathoms. Komeni Kefali, a promontory 130 feet high with Nisis Fustipidimi lying close southeastward, is situated about 1,200 yards northeastward of the northwestern entrance point of Ormos Faiakon.

ORMOS KREVATSOULA is entered between Komeni Kefali and Akra Kefaloipsos about 1 1/4 miles north-northwestward. A bank, 800 yards wide at its head and with depths of less than 5 fathoms, fringes the shore of Ormos Krevatsoula. A conspicuous church and villa lie on the southwestern side of the bay.

ORMOS IPSO (Ypso) lies between Akra Kefaloipsos and a point about 1 1/2 miles north-northeastward. The shores of this bay are fringed by a bank, with depths of less than 5 fathoms, that is 800 yards wide in places. A conspicuous red house stands about 600 yards northwestward of Akra Kefaloipsos. Vessels find anchorage occasionally in Ormos Ipso in depths of 7 to 10 fathoms with Akra Kefaloipsos bearing 260°, distant about 1,600 yards. The bottom, though mud, is poor holding ground. The village of Pyrgi lies at the northern end of the bay. See section 8E-1.

From the northern entrance point of Ormos Ipso the coast trends east-northeastward about 3 1/4 miles to Akra Agni and is bold and steep-to. There are two small bays, Ormos Kalami, the northern one, lies between Akra Agni and a point about 3/4 mile northeastward. The village of Kouloura stands on this point.

AKRA AYIOS STEFANOS lies about 1 1/2 miles north-northeastward of the point on which the village of Kouloura is situated.

SEPPA ROCKS (39°48'N., 19°59'E.), one of which is above water, lie on a reef that extends about 1/4 mile east-northeastward from the point situated about 400 yards northward of Akra Ayios Stefanos. These rocks are steep-to on their eastern side. The width of Vorios Stenon Kerkiras at this point, between the rocks and the mainland east-southeastward, is about 1 mile. In calm weather the rocks are visible on account of the reddish color of the water in their vicinity. A BEACON marks the above-water rock; a LIGHT BUOY is moored about 300 yards eastward of the beacon. Vessels should pass eastward of the buoy. The northeastern extremity of Kerkira lies about 1/4 mile northward of Serpa Rocks.

AKRA VARVARO (Barbara) lies a little over 1 mile northwestward of the northeastern extremity of Kerkira. Akra Psaromita, close southeastward of Akra Varvaro, is marked by a light. Ormos Bolana (Vroulias) open northward, is entered between Akra Varvaro and Akra Atolikos, about 1/2 mile westward. This bay affords shelter from southerly winds. A bank, with less than 5 fathoms over it, fringes the shores of the bay. Some rocks lie close off Akra Varvaro, and a shallow bank extends about 200 yards from its northwestern side. A detached bank, with a depth of 7 fathoms, lies 600 to 800 yards north-northwestward of this cape.

AKRA KASSIOPIS (Cassopo), on which are the ruins of a Venetian fort, lies about 1/2 mile northwestward of Akra Atolikos. A

sunken rock lies close offshore a short distance southeastward of Akra Kassiopis.

ORMOS ASPRO (Aprau) is situated between Akra Kassiopis and Akra Ayios Spiridhon (Spiridione), about 2 miles west-northwestward.

Between Akra Ayios Spiridhon and Akra Ayia Aikaterini, about 1 1/4 miles west-northwestward, the coast is fringed by a bank having depths of less than 5 fathoms and which is about 1/2 mile wide.

8E-16 THE EASTERN SIDE OF NOTIOS STENON KERKIRAS from Nisos Sivota to Kep 1 Stilo, a point near the Greek-Albanian border situated about 20 miles north-northwestward, is very irregular and indented by numerous bays and coves. A LIGHT is shown on a point in Ormos Mourton situated about 1 1/4 miles eastward of the light on Nisos Sivota. Potamos Thiamis, the largest of many rivers and streams along this part of the coast, discharges through two mouths, its southern one located about 8 miles north-northwestward of Nisos Sivota, and its northern mouth about 10 miles southeastward of Kep 1 Stilo. The coast between the mouths of this river is fronted by an extensive flat with depths of less than 3 fathoms that extends as much as 2 1/2 miles offshore. In 1961, the delta of the southern mouth of Potamos Thiamis had extended about 1,400 yards seaward. Katartou Rock with a depth of 3 fathoms, lies nearly 1 mile offshore in a position about 3 1/2 miles east-southeastward of Kep 1 Stilo. See section 8E-1.

PRASUIDI, an islet 100 feet high and covered with vegetation, lies in the approach to Ormos Igoumenitsis about 1 1/2 miles southward of the southern mouth of Potamos Thiamis.

A LIGHT is shown on Prasuidi.

A PROHIBITED AREA, 1 mile wide, extends from the vicinity of Prasuidi (sec. 8E-16) to the mainland about 13 miles north-northwestward.

Ormos Igoumenitsis (39° 30' N., 20° 17' E.), the most sheltered of the several bays and coves along this part of the coast, is entered about 6 miles northward of Nisos Sivota between Nisis Ayios Dhionisios and Akra Dhrepanon, about 2/3 mile northeastward. Shoals extend between the entrance points, forming a bar. A 7 3/4 fathom shoal is about 3/4 mile westward of Nisis Ayios Dhionisios.

There are general depths of 9 to 14 fathoms in the greater part of the bay, access to which is by a channel with a least depth of 22 1/4 feet (1966). The channel, on an axis of 103° - 283°, is marked by three pairs of light buoys. A Light is shown on Akra Kodramourto, about 1/2 mile eastward of Nisis Ayios Dhionisios.

The pier at Igoumenitsa, a village on the eastern side of the bay, is about 417 feet long with a depth of 23 feet alongside. Two LIGHTS displayed vertically, are shown from the head of the pier. A quay, with depths of 10 to 16 feet off it, extends about 330 feet southeastward from the pier.

A small T-head pier, with 26 feet at its head, is located about 1 mile southwestward of Igoumenitsa.

Provisions and water are available.

Igoumenitsa has telegraph service and is connected by ferry to Corfu, Patrai, and the Italian coast.

ORMOS SAYIADHAS, which indents the coast about 2 miles, is entered between a point about 1/2 mile north-northwestward of the northern mouth of Potamos Thiamis and Akra Strovili, the extremity of a small peninsula which rises to a remarkable 377-foot conical hill, about 4 3/4 miles northward. The southeastern side of the bay is bordered by a bank, about 1 1/2 miles wide, with depths of less than 5 fathoms. A vessel entering should keep near the northern shore and anchor with the customhouse bearing 089° in depths of from 4 to 12 fathoms, mud. The small town of Saviadha lies inland from the pier. A light is shown southward of the customhouse at the head of the bay, and another LIGHT is shown from the pier in front of the customhouse.

PAGANIA PENINSULA, 270 feet high, lies about 1 3/4 miles west-northwestward of Strovili. Paganía harbor lies on the northern side of the peninsula.

KEP I STILO, about 5 miles west-northwestward of Akra Paganía, the northwestern extremity of the Paganía Peninsula, is low and projecting. See section 8E-1.

GJII BUTRINTIT is entered between a point about 2 miles northward of Kep 1 Stilo and the mouth of Lum 1 Butrintit. This bay is considered to afford the best ANCHORAGE off the eastern side of Stenon Kerkiras in 17 fathoms, mud, about 600 yards offshore at the southern end of the bay.

8E-17 Kep i Skalës lies about $3\frac{1}{2}$ miles northward of Kep i Stilo. Between it and a point $1\frac{1}{4}$ miles farther north-northeastward the land rises sharply to an elevation of 496 feet. Vórios Sténon Kérkiras is its narrowest at this point. A bay is situated between the last mentioned point and a point about $1\frac{1}{2}$ miles still farther north-northeastward.

Tetranisi, a group of four islets, lie in the southern part of this bay. Vessels with local knowledge anchor occasionally off the southern side of Tetranisi in depths of 9 or 10 fathoms, sand. The shelter is very good in easterly or southerly winds, but the depths are irregular.

Nisis Peristerai (Tignoso), a very small islet, is located about $1\frac{3}{4}$ miles northwestward of Tetranisi. A light is shown from Nisis Peristerai Barkétta (Barchetta), a rock only a few feet above water, lies about $\frac{1}{2}$ mile eastward of the light structure on Nisis Peristerai.

Dente Point, about $3\frac{1}{2}$ miles north-northeastward of Tetranisi, is the southern entrance point of Gji i Sarandës. Ferruç the northern entrance point, is situated about 2 miles north-northwestward. The town of Sarandë is situated at the northern end of the bay. A pier, with 11 $\frac{1}{2}$ feet at its head, is in the western part of Gji i Sarandes. A light buoy, marks a 1-fathom shoal, about $\frac{1}{2}$ mile southward of Sarande. A dangerous wreck lies in the eastern part of Gji i Sarandes. The village of Lekures, which is conspicuous, lies about 1 $\frac{1}{2}$ miles northeastward of Dente Point. A light

is shown about $\frac{3}{4}$ mile southwestward of Lekures. Northward of this village there is a fort on a conical hill, 853 feet high.

Between Ferruç and Kep i Kefali, $4\frac{1}{2}$ miles northwestward, the depths are considerable at a distance of $\frac{1}{2}$ mile offshore. A 7-fathom patch lies about 3 miles south-eastward of the cape and 700 yards from the coast. It was reported (1947) that the coast between Ferruç and Kep i Kefali lies 200 yards to 400 yards farther southwestward than charted.

ANCHORAGES

8E-18 Órmos Fanári.—See section 8E-5.

Órmos Ayiou Ioánnou.—See section 8E-5.

Limín Párgas.—See section 8E-5.

Órmos Ayios Yeóryios.—See section 8E-7.

Prohibited anchorage.—A prohibited anchorage area in Nótios Sténon Kérkiras, eastward and northward of Akra Asprókavos, is indicated by dashed lines on the chart.

Órmos Levkímmi.—See section 8E-9.

Akra Voukári.—See section 8E-9.

Mesongí.—See section 8E-9.

Benítsa.—See section 8E-9.

Prohibited anchorage.—See section 8E-9.

Kérkira.—See section 8E-12.

Órmos Sayiádhas.—See section 8E-16.

Gji i Butrintit.—See section 8E-16.

Gji i Sarandës.—Large vessels anchor near the middle of this bay in depths of 13 to 16 fathoms, good holding ground, mud and sand. Small vessels find shelter in the northern part of the bay abreast Lekures fort.

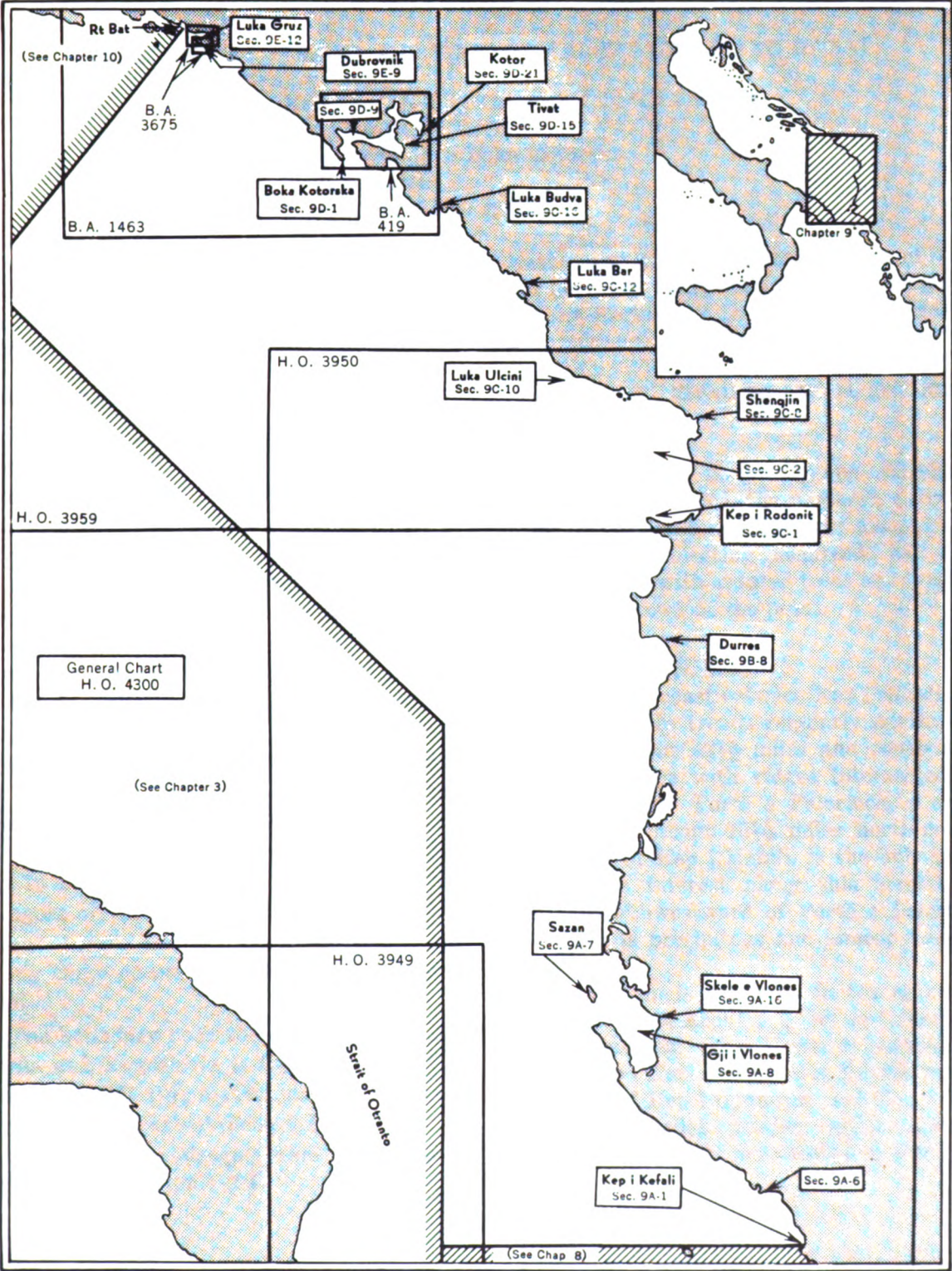


Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office
Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 9—GRAPHIC INDEX

CHAPTER 9

THE COASTS OF ALBANIA AND YUGOSLAVIA—KEP I KEFALI TO RT BAT

- Part A. Kep i Kefali to Sazan, including Gji i Vlonës.
- Part B. Sazan to Kep i Rodonit.
- Part C. Kep i Rodonit to Boka Kotoraska.
- Part D. Boka Kotoraska.
- Part E. Boka Kotoraska to Rt Bat.

Plan.—This chapter describes most of the west coast of Albania and a part of the northwest coast of Yugoslavia. The arrangement is generally northward from Kep i Kefali, on the mainland northward of the eastern end of Nisos Kérkira, to the Albania-Yugoslavia border, thence northwestward to Rt Bat, the western entrance point of Luka Zaton.

GENERAL REMARKS

9-1 The coasts of Albania and Yugoslavia from Kep i Kefali to Rt Bat trend northwestward and northward for about 125 miles to the head of Pellg i Drinit, thence northwestward for about 88 miles to Rt Bat. These coasts are irregular; many bays indent the coast line. Bold mountains extend to the shore along most of this stretch of coast and along the remainder they are located about 5 to 8 miles inland. Many rivers flow into the sea on the Albanian coast. Most of the coast described is steep-to, particularly the coast of Yugoslavia. Except for a few wrecks, the charted dangers off the Albanian coast all lie within the 10-fathom curve, which lies up to 4 miles offshore. The few charted dangers off the Yugoslav coast all lie within about 1 mile of the shore. Several ports along these coasts are commercially important.

The boundary near the coast between Albania and Yugoslavia is formed by the Bojana (sec. 9C-10), a river discharging into the northern part of Pellg i Drinit.

Caution.—For danger areas along these coasts, see section 1-24.

PART A. KEP I KEFALI TO SAZAN, INCLUDING GJI I VLONËS

9A-1 Kep i Kefali (Cape Kiephali) ($39^{\circ}54' N.$, $19^{\circ}56' E.$), the northern entrance point of Vórios Stenón Kérkiras (sec. 8E-1), is a round projecting headland, 489 feet high, covered with stunted trees and bushes. A light is shown on the point.

COAST—GENERAL

9A-2 The coast between Kep i Kefali and Kep i Gjuhëzës trends regularly northwestward for about $42\frac{1}{2}$ miles and consists of bold mountains with ridges intersected by valley troughs. Portë e Palermos, a small port located about $10\frac{1}{2}$ miles north-northwestward of Kep i Kefali, is the only place of relative interest along this stretch of coast. Northwestward of Portë e Palermos the coast is precipitous and almost inaccessible.

Sazan is an island lying in the approach to Gji i Vlonës about 3 miles northward of Kep i Gjuhëzës. Gji i Vlonës is entered between Kep i Karlovecit, about 2 miles north-eastward of Kep i Gjuhëzës, and Kep i Trelimës, $5\frac{1}{4}$ miles farther northeastward. Several small ports are located in this bay.

DANGER—DEPTHS

9A-3 Gorgontas Bank, small in extent and with a depth of 8 feet, lies about $\frac{1}{2}$ mile offshore in a position $4\frac{1}{4}$ miles northward of Kep i Kefali.

Excepting this bank, the depths along this coast are considerable. Between Kep i Kefali and Portë e Palermos the 5-fathom curve lies about $\frac{1}{4}$ mile offshore; thence the depths increase abruptly to seaward. Between Portë e Palermos and Kep i Gjuhëzës the coast is very steep-to. General depths in Gji i Vlonës are 12 to 28 fathoms; however, there are some dangerous wrecks in the bay. Dangers near the shore are described with the related features.

NAVIGATION

9A-4 Vessels bound for east Adriatic ports and passing westward of Nisos Kérkira and the off-lying islands (sec. 8E-7) may, after arriving at a position about $6\frac{3}{4}$ miles southwestward of Nisos Othonoi (sec. 8-2), steer a course of 357° for $43\frac{3}{4}$ miles to a position about $2\frac{1}{4}$ miles westward of Sazan Lighthouse.

Vessels proceeding northward through Vórios Stenón Kérkiras and having continued northwestward as prescribed for the track in section 8D-3 may, from a position about $2\frac{3}{4}$ miles southwestward of Kep i Kefali, continue steering a course of 315° for $38\frac{1}{4}$ miles to a position about $5\frac{1}{4}$ miles southwestward of Mal i Koret (sec. 9A-6), at which position Kep i Gjuhëzës will come into range 003° with the eastern extremity of Sazan. This course closes the coast at a distance of not less than $1\frac{3}{4}$ miles and is free from all dangers; the depths are not less than 35 fathoms. From the latter position, if bound for Gji i Vlonës, a course of 354° for $7\frac{2}{3}$ miles, passing 1 mile westward of Kep i Gjuhëzës, will lead to a position in the southwestern approach about $1\frac{1}{2}$ miles

northwestward of Kep i Gjuhëzës. However, if bound for ports northward of Gji i Vlonës, vessels may join the coastal track off Sazan, previously described, by steering a course of 345° for about $11\frac{1}{2}$ miles.

Vessels bound for Portë e Palermos via Vórios Stenón Kérkiras from a position eastward of Barketta Rock (sec. 8E-17), may steer a course of 329° for $18\frac{1}{4}$ miles to the entrance of the port. This track leads clear of all dangers in depths of not less than 30 fathoms and passes Kep i Kefali at a distance of 1 mile.

See section 1-24 concerning danger areas.

CURRENTS—WINDS

9A-5 The coastal current that enters the Adriatic Sea through Stenón Kérkiras sets in a northwesterly direction along the coast as far as Kep i Gjuhëzës, wherefrom it sets in a general northerly direction. The velocity of this current is irregular and is affected by prevailing winds. The average velocity is about $\frac{1}{2}$ knot and increases perceptibly as it reaches Kep i Gjuhëzës, especially during southeasterly winds. The alternating tidal currents, although relatively weak in this part of the Adriatic Sea, have a somewhat strengthening or weakening effect. The influence of a persistent southeasterly wind, combined with a favorable tidal current, has developed a strong northwesterly current.

Along this coast the scirocco (sec. 1-30) and the bora (sec. 1-28), which is forecast by the formation of masses of white clouds above or behind the mountains, are most prevalent during the autumn and winter months. The mistraele (sec. 1-33) is the prevailing wind during summer months. Southwesterly winds frequently attain considerable force and set up high seas. Land and sea breezes, alternating with great regularity, prevail during the summer months and frequently cause a rather heavy sea.

COASTAL FEATURES—LANDMARKS

9A-6 The coast between Kep i Kefali and Kep i Gjuhëzës is visible for a considerable distance at sea and between Portë e Palermos and Kep i Gjuhëzës presents a long line of sparsely forested gray cliffs rising directly from the sea with little or no beach.

Lavan (Mount Lëvani), 2,933 feet high, is located $1\frac{1}{2}$ miles inland and about 5 miles north-northeastward of Kep i Kefali. Sopot (Mount Sopot), 5,953 feet high, is located $4\frac{1}{4}$ miles inland and about 5 miles farther north-northeastward.

Gji Gravës (Grava Bay), located about 10 miles north-northwestward of Kep i Kefali, is a small bight open to the southward. The monastery of Shën Dhimitër (Saint Demetrio) stands about $\frac{1}{4}$ mile inland at the head of the bay. The ruins of Fort Borsh, located on a 994-foot hill about 10 miles northward of Kep i Kefali, and the village of Qeparo, standing on the slopes of the coastal mountains about $1\frac{1}{4}$ miles westward of the fort, are useful landmarks in identifying Gji i Gravës and Portë e Palermos.

Portë e Palermos, used primarily as an anchorage is located on the western side of a high ridge of land, a tongue of which projects $\frac{3}{4}$ mile southward along the western side of the bay and slopes gradually to Kep i Kavadonit (Cape Kavadoni), the northern point of entrance to the bay. Kep i Palermos (Palermo Point), 338 feet high, is the western extremity of a peninsula that shelters the southeastern side of the bay. The entrance of the bay between Kep i Palermos and Kep i Kavadonit, about $\frac{3}{4}$ mile wide, is open to the southwestward. A small projection, on which a fort stands, extends a short distance westward from the village of Shënkoll (San Nicolo), located about $\frac{3}{4}$ mile northward of Kep i Palermos, and divides the bay into two arms. Armarida Bay, the

northwestern arm, has depths of $7\frac{1}{2}$ to 40 fathoms and is sheltered from all but southwesterly winds. Panormo and Shënkoll Bays, with depths of $4\frac{1}{2}$ to 35 fathoms, form the southeastern arm of the bay.

The shore on the eastern side of the entrance of the bay should not be approached too closely as it is fringed with rocks awash.

There is a wooden jetty in the northern part of the port. A small number of caiques and lighters are available.

Lights.—A light is shown near the southwestern extremity of Kep i Palermos.

Anchorage.—The prevailing wind should be considered in the choice of an anchorage. The shelter in Portë e Palermos is good, but the depths increase so rapidly offshore that anchors drag in a bora. The bottom is rocky in various parts of the bay. Anchorage can be taken in Armirada Bay in 10 to 32 fathoms, mud; in Panormo and Shënkoll Bays, in slightly lesser depths, mud, about 200 yards from the head of the bay, respectively.

Gryk'e Spiles (Spila Bay), $2\frac{1}{2}$ miles northward of Portë e Palermos, is a small indentation in the coast open to the southwestward. This open roadstead, although steep-to with depths of 12 to 28 fathoms within about 150 to 300 yards offshore, affords moderate shelter from northeasterly winds. It is frequented by small native craft. The small village of Spile stands near the northern shore of the bay.

Anchorage for small coastal vessels is available in 5 to 15 fathoms, sand and mud, about 160 yards offshore in the northern part of Gryk'e Spiles.

Maj'e Çikës (Mount Cika), rising to a height of 6,644 feet, lies about 3 miles inland about midway between Kep i Kefali and Kep i Gjuhëzës. Maj'e Qorrës (Koire), equally

conspicuous, rises to a height of 6,619 feet about 2 miles northwestward of Maj' e Çikës. Rrugë e Bardhë (Strande Bianchi) is a remarkably conspicuous white watercourse of a great torrent which, descending steeply from Maj' e Çikës, approaches the sea about 3 miles southwestward of that mountain and presents the appearance from many miles seaward of a broad white patch.

Kep i Gjuhëzës (Cape Linguetta) ($40^{\circ}25'$ N., $19^{\circ}18'$ E.), the northwestern extremity of a mountainous rectangular peninsula that forms the western side of Gji i Vlonës (sec. 9A-8), is a small and comparatively low projection. The coastal range of which Maj' e Çikës is the summit, gradually declines and terminates at Kep i Gjuhëzës. Mal i Koret or Shënavasil (Mount Vasilio), the 2,749-foot summit of the peninsula, is located about $4\frac{1}{2}$ miles south-southeastward of the cape.

Three black mooring buoys lie between Kep i Gjuhezës and the southern end of Sazan (sec. 9A-7).

Kep i Karlovecit (Garlovez Point), the southern entrance point of Gji i Vlonës and the northern extremity of the peninsula mentioned above, is located about $1\frac{3}{4}$ miles northeastward of Kep i Gjuhëzës. A light is shown on the point.

SAZAN

9A-7 Sazan (Saseno Island), lying in the approach to Gji i Vlonës with its southern extremity about 3 miles northward of Kep i Gjuhëzës, is 1,085 feet high and $2\frac{1}{2}$ miles long, north and south. The island has two almost equally high peaks separated by a depression which, at a distance, give it the appearance of two islands. A signal station stands on the summit of the island.

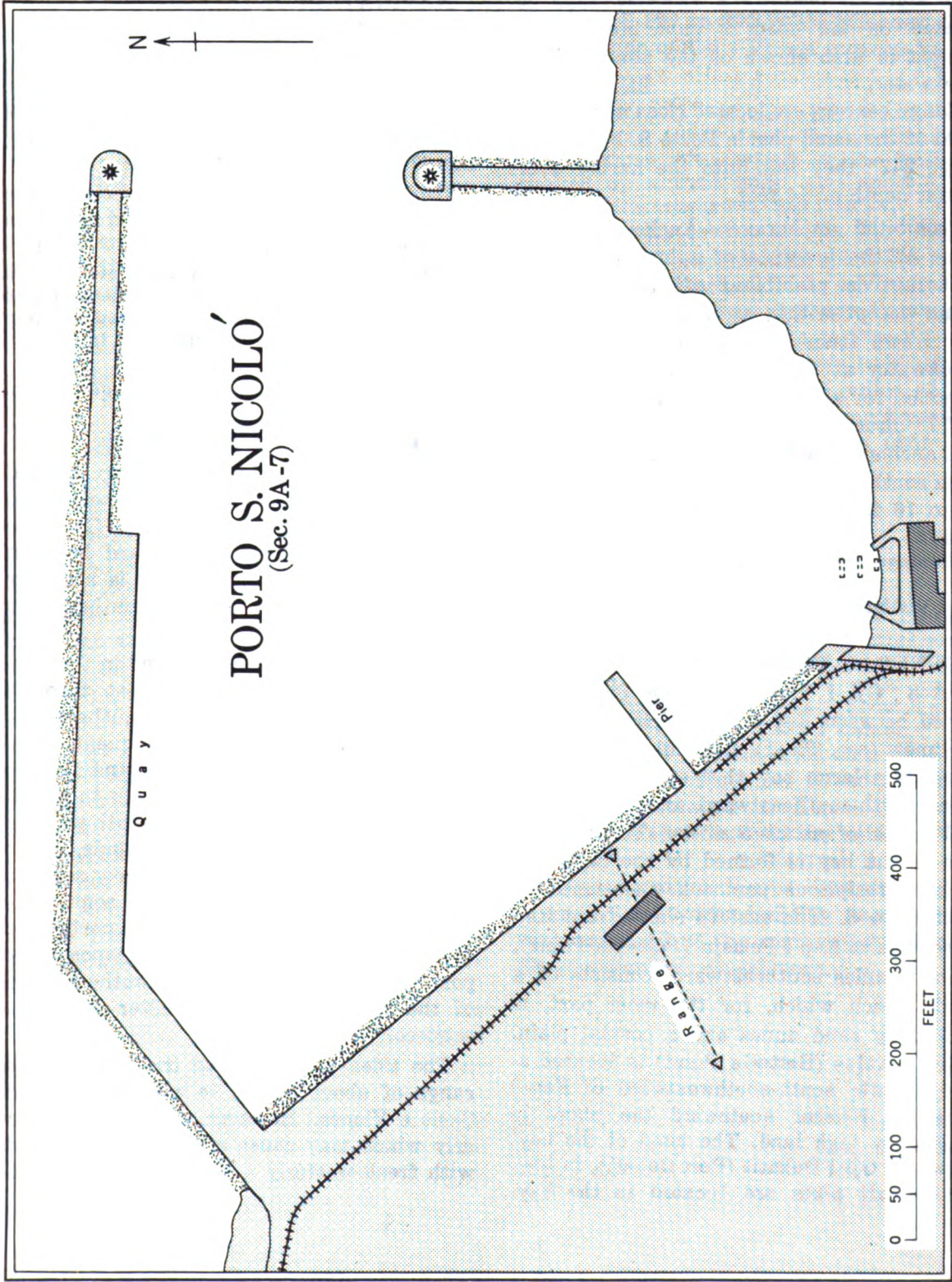
The western and southern sides of Sazan are steep-to and free from dangers. Several caves and clefts in the rocks mark the western side; in places vertical cliffs, over 300 feet high, rise from the sea. A light is shown from a tower, adjacent to a dwelling,

on the northwestern coast of the island at an elevation of 651 feet. The eastern side of the island is less rugged, but is nevertheless difficult of access except on the northeastern side at Baia di S. Nicolo.

The 5-fathom curve lies at its greatest distance off the eastern extremity of Sazan where it parallels the shore at a distance of 500 to 600 yards and thence passes close eastward of the northern breakwater at Porto S. Nicoló. The 10-fathom bank that extends southwestward from Kep i Trelimës (sec. 9B-1) and parallels the mainland northward of that cape at a distance of about 3 miles offshore lies about $1\frac{1}{2}$ miles eastward of Sazan with depths of 11 to 20 fathoms between the bank and 5-fathom curve off the island.

Porto S. Nicoló ($40^{\circ}30'$ N., $19^{\circ}17'$ E.), a former Italian military and naval base, is a small harbor enclosed by high breakwaters located near the southeastern end of Baia di S. Nicoló. The harbor is sheltered from the northward by a breakwater extending about 250 feet northeastward from the shore and thence eastward about 850 feet. It is protected from the southeastward and eastward by a headland and a partially submerged breakwater about 225 feet long, which projects northward from the shore. The harbor entrance between the breakwaters is about 300 feet wide and 14 to 26 feet deep. In the northwestern part of the harbor there are charted depths of 16 to 24 feet gradually shoaling toward the southeastward.

The northern breakwater is quayed for a distance of about 688 feet from the shore and has depths of 6 to 16 feet alongside. A small pier, with depths of about $6\frac{1}{2}$ to 11 feet alongside, extends about 130 feet from the southwestern shore of the harbor. A small T-head pier, with shallow depths alongside, is located close northwestward of the above pier.



A concrete post on a masonry base is located on the head of each breakwater. A light is also shown on the head of each breakwater.

Range beacons are located close northwestward of the small pier in Porto S. Nicoló. In range 242° they lead into the harbor over a least depth of 14 feet.

Prohibited anchorage—Anchorage.—Because of the presence of submarine cables anchorage is prohibited off the coast of Sazan except within an area defined by a line drawn from the head of the southern breakwater at Porto S. Nicoló in an 025° direction for about 370 yards and thence in a 277° direction to the shore of the island. The anchorage within this area is sheltered from southwesterly winds and has depths of 11 to 16 fathoms, mud, about ½ mile off-shore.

Pilotage.—Pilotage is compulsory.

GJI I VLONËS

GENERAL REMARKS

9A-8 Gji i Vlonës (Valona Bay), contained between Kep i Karlovecit and Kep i Trelimës (sec. 9B-1) 5¼ miles northeastward, is a large bay that extends about 9 miles south-southeastward and has a general width of about 5 miles. The western side of the bay is formed by the high and almost precipitous peninsula mentioned in section 9A-6. The eastern shore from Kep i Trelimës to Kep i Pelasja (Pelasgia Point), about 6 miles southeastward, consists of a sandy beach which, for the most part, is backed by sand dunes and a coastal plain.

Kep i Kalas (Batteria Point) is located about 1 mile south-southwestward of Kep i Pelasja. Farther southward the shore is backed by high land. The head of the bay, known as Gji i Dukatit (Port Dukati), is low. Two small ports are located in the bay.

NAVIGATION

9A-9 Vessels approaching the Adriatic Sea from westward and bound for Gji Vlonës may, after arriving at a position about 4 miles southeastward of Capo Santa Maria di Leuca (sec. 3A-1), steer a course of 043° for 57 miles to a position about 1¾ miles northwestward of Kep i Gjuhëzës. This course leads clear of all dangers and in depths of not less than about 60 fathoms.

Vessels entering Gji i Vlonës steer for a position about 1 mile northwestward of Kep i Karlovecit and thence are guided to their destination by the directions given in section 9A-15.

See section 1-24 concerning danger areas.

CURRENTS — WINDS — TIDES

9A-10 The northwest-trending coastal current (sec. 9A-5) sets northeastward through the passage between Kep i Gjuhëzës and Sazan and thence northward between Sazan and the mainland, but it is not very strong except with strong southeasterly winds.

In general, the prevailing wind in the winter is from the north-northwest through north to north-northeast and southeasterly and southwesterly winds are frequent. During the summer the prevailing wind is from the west-northwest through north to northeast and southeasterly and southwesterly winds are rare. Northwesterly winds, which occasionally blow hard, send a heavy sea into the outer part of Gji i Vlonës and some swell into Gji i Dukatit. The low land northward of Skele e Vlonës (sec. 9A-16) exposes the port to the bora. The hills southeastward of the port afford some shelter from the scirocco.

The tides are weak and irregular with a range of about 1 foot in calm weather at Skele e Vlonës. However, strong southeasterly winds may cause a rise of 2 feet, but with fresh westerly winds tides are negligi-

ble. A relatively weak inshore current follows the outline of the coast from Kep i Trelimës and sets southeastward, thence southward and westward, and, after rounding the head of Gji i Dukatit, sets in a northerly and northwesterly direction.

DEPTHS

9A-11 The approach to Gji i Vlonës between Sazan and Kep i Karlovecit has depths of 13 to 43 fathoms. A bank, with depths of less than 10 fathoms, extends about 4 miles southwestward from Kep i Trelimës. Between this bank and Kep i Karlovecit there are depths of 12 to 22 fathoms. Excepting the dangers mentioned below, the bay has general depths of 12 to 28 fathoms.

The 5-fathom curve is charted about $\frac{3}{4}$ mile offshore at Kep i Trelimës. It gradually approaches the coast near Skele e Vlonës (sec. 9A-16), where it joins the 10-fathom curve of the above-mentioned bank. Southward of Skele e Vlonës the 5-fathom curve is charted about 600 yards offshore and continues at about this distance to the southward as far as Kep i Pelasja. In 1949 depths of 1 to $1\frac{1}{2}$ fathoms were reported to exist at a distance of about 550 yards offshore in the area near Skele e Vlonës and the coast northwestward of it. Therefore, utmost caution must be exercised when approaching this part of the coast.

Southward of Kep i Pelasja the 5-fathom curve lies about 300 yards offshore, except in the southeastern part of the bay where it lies as far as 800 yards offshore. At Gji i Dukatit (sec. 9A-8) the 5-fathom curve fol-

lows the general trend of the shore at a distance of 300 to 700 yards offshore. The western side of Gji i Vlonës is steep-to.

DANGERS

9A-12 Wrecks.—A stranded wreck lies about $2\frac{1}{4}$ miles south-southwestward of Kep i Kalas. The wreck of the Helicon, marked by a light buoy, lies about $3\frac{1}{4}$ miles northwestward of Kep i Kalas.

A submarine cable is laid in Gji i Vlonës from a position on the shore about $1\frac{1}{2}$ miles west-northwestward of Skele e Vlonës to a position about midway between Sazan and Kep i Gjuhëzës, and thence to Otranto.

Prohibited area.—Vessels are forbidden to approach or anchor within a radius of 750 yards of the two lights close southward of Kep i Pelasja between bearings 095° and 128° .

LANDMARKS

9A-13 Lights.—A light is shown on Kep i Kalas.

A light is shown close to the shore at Valone in a position about $2\frac{1}{4}$ miles northward of Kep i Kalas.

A light is shown from a point on the western shore of Gji i Dukatit, about 6 miles south-southwestward of Kep i Kalas.

The ruins of a castle stand on a 1,245-foot summit located $1\frac{1}{4}$ miles inland and about $9\frac{1}{4}$ miles eastward of Kep i Karlovecit. These ruins are about midway between Skele e Vlonës and Uj të ftohtë (sec. 9A-18) and are a good mark in approaching either place.

An isolated white building near a water tank eastward of the southeastern jetty at Skele e Vlonës is conspicuous.

Uj të ftohtë can be identified by the oil refinery located southward of the jetty and by a group of conspicuous buildings located about $\frac{1}{2}$ mile northward.

PILOTAGE

9A-14 Pilotage is compulsory.

DIRECTIONS FOR ENTERING

9A-15 In general, Gji i Vlonës has deep water and, excepting the dangers mentioned in section 9A-12 and the shoal bank westward of Skele e Vlonës, the bay is free from dangers. Vessels arriving northwestward of Kep i Karlovecit should keep about 1 mile off and round the peninsula at about that same distance.

Vessels are required to enter Gji i Vlonës, keeping south of Sazan.

From the offing the high snow-capped mountains in the interior southeastward of Gji i Vlonës are a good mark for approaching the bay.

See section 1-24 concerning danger areas.

SKELE E VLONËS

Position: 40°27' N., 19°29' E.

Depths:

Approach, 12 to 20 fathoms.

Anchorage, 10 to 18 fathoms.

Jetty berth, 4 to 22 feet.

Tidal rise: MHWS, 1 foot; MHWN, $\frac{1}{2}$ foot.

9A-16 Skele e Vlonës, the port of Vlonë, is located in the northeastern part of the bay about $7\frac{3}{4}$ miles eastward of Kep i Karlovecit.

Harbor.—This port is an artificial harbor protected by two long jetties. The northwestern jetty extends 540 feet southward from the shore and the southeastern jetty extends about 1,000 feet south-southwestward from the shore about 400 yards southeastward. The harbor entrance between the jetties is about 350 yards wide. The harbor can accommodate large-sized vessels.

Vessels unable to berth alongside carry out cargo operations into lighters at the anchorage. There is anchorage about $\frac{3}{4}$ mile off-

shore between the port and Kep i Pelasja in depths of 10 to 13 fathoms. The bottom is principally mud and weed, but some rocks have been found. This anchorage is exposed to northwesterly winds, which cause heavy seas, and the bora is felt severely.

Two mooring buoys are located off the jetties at Skele e Vlonës.

An offshore pipeline berth is located about 2 miles southward of Skele e Vlonës. Tankers secure to mooring buoys with their sterns toward a short pier. The mooring berth has depths of 36 to 42 feet.

The pier is 170 feet long and has depths of about 20 feet alongside.

9A-17 Vlonë (Valona) is a town located about 1 mile inland and northward of its port area, Skele e Vlonës. This is one of the principal ports of Albania. The population was estimated to be 45,350 in 1964. Salt, olive oil, and natural asphalt are exported.

The northwestern jetty, or salt pier, is not used. The southeastern jetty has three usable sections. The southern end is 330 feet long with depths of 18 to 22 feet; the central portion is 240 feet long and has 12 to 18 feet of water alongside, and the northern end is 430 feet long with depths of 4 to 12 feet alongside. Large vessels, with a length of over 320 feet, berth alongside the jetty with one end of the ship protruding beyond the end of the jetty. Thence, to effect the remainder of the cargo operations, the vessels is shifted about. Several tugs and lighters are available.

Provisions may be procured in limited quantities. A very small supply of coal is stocked. Water may be taken at Uj të ftohtë or at the southeastern jetty. A small machine shop that might undertake limited machine work is located at Skele e Vlonës. There is steamer communication with other Adriatic ports. Vlonë has telegraph service. A civil hospital is located in the town.

9A-18 Uj të ftohtë (Krienero), an oil port at the terminus of the pipe lines from the Kuçovë oil fields, is an open roadstead located about 2 miles southward of Skele e Vlonës. A jetty, in a state of disrepair, extends about 175 feet west-northwestward from the shore.

Three mooring buoys are located close northward of Kep i Kalas. These buoys are each equipped with 6-inch oil lines from which vessels may load at the rate of 230 tons per hour. These buoys are also used by vessels receiving or discharging freight.

The maximum draft at this terminal is 29 feet.

Water is available from a natural spring located near the shore and is received through one or two pipes. Vessels moor stern-to about 11 yards from the rock face which forms the bank at the position where the water is available.

Anchorage.—Vessels intending to remain in Gji i Vlonës for any length of time should anchor in Gji i Dukatit at the head of the bay, where there is shelter from all winds. Large vessels anchor about $\frac{1}{2}$ mile offshore in depths of 11 to 16 fathoms, mud, but the holding ground is reported to be unreliable. The best anchorage is reported to be about $\frac{3}{4}$ mile northwestward of the mouth of the Izvoru River, located in the southeastern part of Gji i Dukatit, in a depth of 16 fathoms, mud.

ANCHORAGES

9A-19 Portë e Palermos.—See section 9A-6.

Gryk' e Spiles.—See section 9A-6.

Sazan (Porto S. Nicoló).—See section 9A-7.

Gji i Vlonës

Skele e Vlonës.—See section 9A-16.

Uj të ftohtë.—See section 9A-18.

Gji i Dukatit.—See section 9A-18.

PART B. SAZAN TO KEP I RODONIT

9B-1 Sazan, lying in the approach to Gji i Vlonës, is described in section 9A-7.

Kep i Trelimës (Cape Treporti) ($40^{\circ}30' N.$, $19^{\circ}25' E.$), the northeastern entrance point of Gji i Vlonës, is 94 feet high and is located about $5\frac{1}{4}$ miles eastward of Sazan. It is the southern extremity of a low line of hills which rise to an elevation of 198 feet a short distance inland. The cape is fringed by sunken rocks extending about 350 yards offshore. A light is shown about 1 mile northwestward of the cape.

COAST—GENERAL

9B-2 The coast from Kep i Trelimës to Kep i Rodonit, the southern entrance point of Pellg i Drinit, trends in a general north-northeasterly direction for about 66 miles and presents a marked contrast to the rugged mountainous land in the vicinity of Gji i Vlonës. Between Kep i Trelimës and Kep i Lagit, the southern point of entrance of Gji i Durrësit about 39 miles north-northeastward, there are few landmarks of navigational interest. The shore is a continuous sandy beach interrupted only by the mouths of the rivers discharging into the sea. Sand dunes lie behind the beach and inland a deltaic plain, consisting of a wide expanse of lagoons and marshes, extends as far as the hills of the interior. Between Gji i Durrësit, the only place of commercial importance along this stretch of coast, and Kep i Rodonit the coast becomes bold and presents a rugged aspect.

DEPTHS—DANGERS

9B-3 Excepting the depths in Gji Durrësit, the 10-fathom curve is charted not more than 4 miles offshore and, following the general trend of the coast, lies approximately $1\frac{1}{2}$ to 2 miles off the salient points.

Caution.—The mouths of the rivers Vjosë, Seman, and Shkumbi (sec. 9B-6) are subject to great changes caused by the alluvial deposits which form banks that extend some distance offshore and are constantly increasing in extent. The depths off the Albanian coast were reported (1913) to be less than those charted and alterations of the coast line have been reported between Vjosë and Kep i Rodonit. Great care is necessary when navigating along this coast.

A $5\frac{1}{2}$ -fathom patch lies about 8 miles northward of the light off Vjose River entrance. A shoal with a depth of 4 fathoms 5 feet lies about 2 miles offshore about 26 miles north-northeastward of the northern extremity of Sazan.

Dangers adjacent to the coast are described with the related coastal features.

NAVIGATION

9B-4 Vessels proceeding northward along the coast of Albania from a position about $2\frac{1}{4}$ miles westward of Sazan (sec. 9A-4), may steer a course of 006° for $65\frac{3}{4}$ miles to a position about $3\frac{1}{2}$ miles westward of Kep i Rodonit. This course clears all the salient points on the coast at a distance of about 2 to 3 miles and has general depths of 17 to 56 fathoms.

Caution.—In the area between Kep i Lagit and Sazan, vessels are reminded to exercise maximum caution in approaching the coast. At night it is prudent to steam away from the coast at a greater distance than required by the usual margin of safety.

See section 1-24 concerning danger areas.

CURRENTS—WINDS

9B-5 From the island of Sazan the current appears to divide into two parts. The inshore branch of this current sets predominantly in a general northerly and north-northeasterly direction along the shore as far as Kep i Rodonit with an irregular and often scarcely perceptible velocity. It is greatly affected by the wind and, at times with a southeasterly wind, attains a velocity of 1 to $1\frac{1}{2}$ knots. The influence of the effluent rivers is felt to a certain extent after a period of rain, but the condition is local. The current is strongest off the headlands and in the bays it appears to be diffused.

The offshore branch of this current sets in a general northerly and north-northwesterly direction at a velocity of $\frac{1}{2}$ to 2 knots. This current is likewise affected by the wind.

The prevailing winds along this coast are the same as those described in section 9A-10, except that the bora is not as severe.

COASTAL FEATURES—LANDMARKS

9B-6 The rivers Vjosë (Vojuca), Seman (Semeni), and Shkumbi (Skumbi) empty into the sea in positions about 9, $22\frac{1}{2}$, and

$30\frac{3}{4}$ miles, respectively, north-northeastward of Sazan. A light is shown from a 33-foot square metal structure having white bands about $\frac{3}{4}$ mile off the entrance of the Vjose.

Samana Point is a low projection extending westward about $2\frac{1}{4}$ miles from the coast in a position about 17 miles north-northeastward of Sazan. Several houses stand on the cape. It is reported (1959) that the shape of the point is incorrectly delineated on the chart. In bad weather its alluvial ground is likely to be covered by the sea. A sandspit about 1 mile long projects from the northern side of the point. This sandspit and the coastal configuration forms a basin used as an anchorage by local sailing craft. A canal, marked by lights, enables these craft to enter from the sea.

Pietrit Bay lies between Samana Point and the mouth of the Seman, about 5 miles northeastward, and has depths of less than 5 fathoms within 2 miles of the head of the bay. The 5-fathom curve is charted about 1 mile seaward of Samana Point and the mouth of the Seman. This bay affords temporary anchorage to small vessels during the good season (sec. 9B-10).

Note.—The profile of the coast between the mouth of the Shkumbi River and Pietrit Bay, reportedly appears to be different from that shown on the chart.

Monastir i Ardenicës (Kloster Ardenizza), a conspicuous monastery with a campanile, stands on a 662-foot hill about 12 miles eastward of Samana Point. Another monastery with a campanile, located near the village of Pojan about 8 miles southeastward of Samana Point, is a useful landmark.

Kep i Lagit (Cape Laghi), the southern entrance point of Gji i Durrësit, is the northwestern extremity of a wooded range of hills that extend about $7\frac{1}{2}$ miles southeastward from the cape. Malji Biçerit, the 738-foot summit of this range, lies about $3\frac{1}{2}$ miles southeastward of the cape. Kep i Lagit is covered with brushwood and has a church on its 338-foot summit. A light is shown from Kep i Lagit.

GJI I DURRËSIT

9B-7 Gji i Durrësit (Durrazzo Bay) lies between Kep i Lagit and Kep i Durrësit, located about $9\frac{3}{4}$ miles northward. The bay recedes about 4 miles eastward. A range of hills backs the northeastern part of the bay; in general, however, the shore of the bay is low and forms a contrast to the high land of the capes. The northern and central parts of the bay have good holding bottoms; the southern part is not navigable because of Selada Banks.

Kep i Durrësit (Cape Durazzo) is the southern extremity of a high coastal ridge that extends about 4 miles northward. This ridge, **Mal i Durrësit**, rises to a 608-foot summit about $1\frac{1}{2}$ miles northward of the cape. A round sugarloaf hill, 367 feet high, stands on the cape.

DURRËS

Position: $41^{\circ}19'N.$, $19^{\circ}27'E.$

Depths:

Bay approach, 8m (4 $1\frac{1}{4}$ fm) to 11m (6 fm).

Entrance and outer part of harbor, 5.5m (18ft.) to 7.3m (24 ft.).

Anchorage, 11m (6 fm).

Berths, 3.6m (12 ft.) to 7m (23 ft.).

Tidal rise: MHWS, 1 foot; MHWN, $1\frac{1}{2}$ foot.

Port plan: See section 9B-16.

9B-8 The harbor of Durrës is located in the northwestern part of Gji i Durrësit about 48 miles north-northeastward of the island of Sazan.

NAVIGATION

9B-9 Vessels approaching the Adriatic Sea from the westward and bound for Gji i Durrësit may, after arriving at a position about 4 miles southeastward of Capo Santa Maria di Leuca (sec. 3A-1), steer a course of $026\frac{1}{2}^{\circ}$ for about 102 miles to a position about $\frac{3}{4}$ mile southward of Talbot Shoal (sec. 9B-11). This course leads clear of all dangers and in great depths, the 10-fathom curve being crossed about 3 miles south-southwestward of Talbot Shoal.

Vessels proceeding northward along the coastal track (sec. 9B-4) and bound for Gji i Durrësit may depart from that track at a position where Kep i Lagit bears 056° , dis-

tant about $7\frac{1}{2}$ miles, wherefrom a course of 026° may be steered for 13 miles to a position about $\frac{3}{4}$ mile southward of Talbot Shoal.

Vessels approaching Gji i Durrësit from the northward may proceed on the coastal track (sec. 9B-4) until Kep i Durrësit is abeam, distant about $4\frac{1}{2}$ miles, and thence course may be altered southeastward until Shkambi i Kavajës (sec. 9B-12) bears 083° . Proceed on that bearing and follow the directions given in section 9B-15.

See section 1-24 concerning danger areas.

WINDS—TIDE

9B-10 The sirocco a southwesterly wind in this area, sends a heavy sea into the bay. Its occurrence is nearly always preceded by long, almost imperceptible waves from the south-southwestward and by the complete visibility of Mal i Tomorrit, Samana Point, Kep i Gjuhëzës, and the island of Sazan. Cargo operations may be interrupted by bad weather, particularly in the winter.

The mean range of tide in Durrës is small; mean high water springs rise 1 foot, and neaps rise $\frac{1}{2}$ foot. The water level is considerably affected by the wind. Land winds, particularly the bora, noticeably lower the level.

DEPTHS—DANGERS

9B-11 A bank, about 1 mile wide and with depths of less than 5.5m (3 fm), borders the shore of the bay and off-lying shoals, described below, encumber the northern and southern parts of the bay. The charted 10-fathom curve trends regularly northward off the entrance of the bay, passing about $1\frac{1}{2}$ miles westward of Kep i Lagit and 1 mile westward of Kep i Durrësit. Between the off-lying shoals the depths decrease rather uniformly from the 10-fathom curve to the 5.5m (3 fm) shore bank.

The approach to the harbor on the entrance range has a least charted depth of 8m (4 $1\frac{1}{4}$ fm) to a position about $1\frac{1}{2}$ mile southward of the harbor entrance. From the latter position to the entrance there are dredged

depths of 6.1m (20 ft.) to 6.7m (22 ft.). An entrance channel was reported dredged (1968) to a depth of 10m (33 ft.) and a least width of 400 feet from a position about 2 1/4 miles south-southwestward of the head of the southwestern breakwater: the channel limits are marked by lighted buoys. A least depth of 8.5m (28 ft.) was reported (1965) in the harbor entrance and alongside West Quay, North Quay and North Quay Pier. Three detached rocky patches with depths of 4.9m (16 ft.), 4.9m (16 ft.), and 5.5m (18 ft.) lie about 1 mile, 2 miles, and 2 1/2 miles northward of Kep i Lagit.

Selada Banks, with a least depth of 2.5m (1 1/4 fm) and over which the sea breaks, lie 2 1/4 miles offshore in a position about 3 1/4 miles northward of Kep i Lagit.

Durres (Durazzo) Banks consists of a reef, with depths less than 5.5m (3 fm), extending about 2 miles southward from Kep i Durresit. A drying sandbank lies about 600 yards south-westward of the cape. A detached 6.5m (3 1/2 fm) patch is charted about 1 1/2 miles south-southwestward of the cape.

Talbot Shoal, with a least depth of 3.6m (2 fm), lies between about 1 1/2 to 2 miles southward of Kep i Durresit. This shoal is a detached portion of Durres Banks and is separated from it by a passage with a depth of 9.8m (5 1/4 fm). A wreck lies on the northeastern part of the shoal. Durres Banks Light Buoy is moored on the southern extremity of the shoal.

A dangerous wreck lies about one mile south-southwestward of the head of the southwestern breakwater; a dangerous wreck, marked by a lighted buoy to southwestward, lies about 1 1/2 miles south-southwestward of the breakwater head.

LANDMARKS

9B-12 Shkambi Kavajës (Sasso Bianco), a conspicuous white cliff, 336 feet high, is located on the eastern shore of the bay in a position about 4 1/4 miles southeastward of Kep i Durrës.

Conspicuous structures in the town of Durrës and its vicinity as follows: The Royal Villa, standing on a hill overlooking the town is a typical castle painted red and is visible from a great distance in clear weather; a round gray stone tower located above the town; a white church with a red roof and a high square tower with a low spire near the southern end of the town. The ruins of the citadel are located on the slope of the hill on which Durrës stands.

HARBOR

9B-13 The harbor of Durrës, eastward of the town, is formed by two breakwaters that are quayed on the inner side. The southwestern breakwater extends about 1/2 mile southeastward from the southern shore of the town and thence extends eastward an additional 250 yards. The eastern breakwater extends about 1/2 mile south-southwestward to a position about 200 yards northward of the head of the southwestern breakwater. A pier extends about 400 feet southeastward from North Quay.

Navigational aids.—A light is shown on the head of each breakwater, and a light is shown about 1/2 mile northward of Kep i Durresit and inland from the coast. A conical buoy is moored about one mile west-southwestward of Kep i Durresit to mark the shoal westward of the cape.

Anchorage.—Larger vessels may take anchorage in the bay about 3 miles southward of Kep i Durresit in a depth of 10.9m (6 fm), mud. Small vessels may anchor about 1 mile south-southeastward of the harbor entrance in depths of 6.5m (3 1/2 fm) to 7.3m (4 fm), mud.

A prohibited anchorage area extends seaward about 3 miles from Kep i Durresit. It is bounded by a line which extends from Kep i Durresit in a southwesterly direction for 3

miles, and by a line which extends westward 3 miles from a position on the shore about $\frac{3}{5}$ mile northward of Kep i Durrësit.

A naval exercise area lies in the southeastern part of Gji i Durrësit.

PILOTS

9B-14 Pilotage is compulsory. Pilots board vessels about 3 miles south-southwestward of the head of the southwestern breakwater.

DIRECTIONS FOR ENTERING

9B-15 Vessels use the main dredged and buoyed entrance channel, which is entered about $2\frac{1}{4}$ miles south-southwestward of the harbor entrance. Fishing boats or ships not larger than 200 gross tons can use the old access channel marked by Durres Banks Light Buoy and the lighted buoy $\frac{1}{2}$ mile eastward.

Caution.—During southwesterly or westerly winds, when the weather is thick or hazy, the shore of the bay is difficult to make out. When Kep i Lagit is obscured and Shkamb i Kavajës cannot be seen, it is not prudent to approach the harbor.

See section 1-24 concerning danger areas.

FACILITIES

9B-16 Durrës (Durazzo) is an old walled town located on the slope of the hills close eastward of Kep i Durrësit. The population was estimated to be 45,935 in 1964. This is the largest port and principal center of Albanian commerce. Tirane, the capital of Albania, is served by the port. Minerals, crude petroleum, animal and agricultural products are exported.

Berths.—The berthing lengths and alongside depths are as follows: (Berth numbers are for reference to the port plan only)

Berth	Length (feet)	Depth (feet)	Name
1	300	20	West Quay Head
2	950	23	West Quay
3	450	23	West Quay
4	900	16	North Quay
5	400	23	North Quay Pier
6	1200	26	New North Quay
7	200	23	East Mole Oil Berth

East Mole Oil Berth is connected by two pipelines to several oil storage tanks ashore. The small piers in the northern part of the harbor are used by the Albanian Navy.

The berths are served by railroad. New North Quay has four 15-ton cranes. A number of lighters are available. Tugs are available and are required for entering, leaving, and berthing.

Supplies.—Fuel oil is available at the oil berth. Water is available.

Repairs.—A small shipyard, located near the root of the southwestern breakwater, is capable of constructing sailing and motor vessels of 500 tons and can undertake minor repairs. Two floating cranes of 5- to 7-ton capacity and one of 20-ton capacity are available. A 150-ton floating crane is also reported available.

Communications.—A railroad and a good highway connect Durres with Tirane. There is frequent steamer communication with ports in the Adriatic and Black Seas.

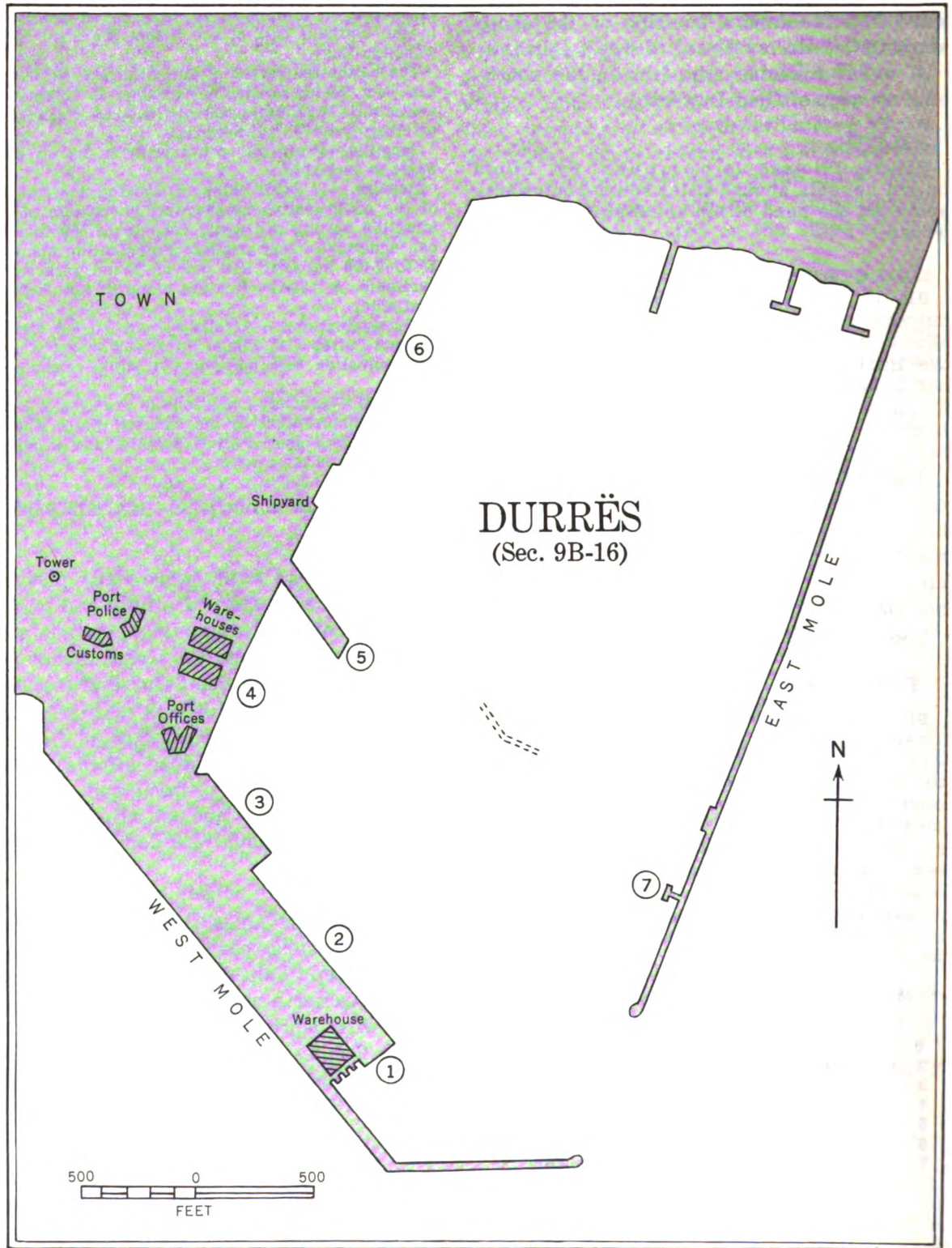
Medical.—Sanitary conditions in the town are poor. Malaria is prevalent in the summer. Water must be treated before use. A civil hospital and a military hospital are in the town.

COASTAL FEATURES—LANDMARKS (Continued)

9B-17 Kep i Palit (Cape Pali), 239 feet high, is the extremity of a hilly and wooded narrow projection extending about 2 miles northwestward from the coast about $6\frac{1}{2}$ miles northward of Kep i Durrësit (sec. 9B-7). A reef with a depth less than 6 feet extends about $\frac{1}{2}$ mile northwestward from the cape. Kep i Palit roadstead affords anchorage, sheltered only from southwesterly winds, in a position about 1 mile east-northeastward of the cape in a depth of $3\frac{1}{4}$ fathoms, mud.

A light is shown on Kep i Palit.

Gji i Lalzës (Lales Bay) is contained in the northeastern part of the bight formed between Kep i Palit and Kep i Rodonit, about $10\frac{1}{2}$ miles north-northeastward. The coastal bank, with depths of 5 fathoms and less, lies within 2 miles of the head of the bay. Seaward of this bank there are general depths of 6 to 13 fathoms. Temporary anchorage



during a bora can be taken about 1 to 2 miles offshore in the northeastern part of the bay in 4 to 7 fathoms, mud.

Caution.—It is reported (1959) that the shore in Gji i Lalzes has undergone a strong backing up in relation to its former line and that the profile of the coast is not in accordance with existing charts. As a result, the depths in this area have undergone considerable changes.

ANCHORAGES

9B-18 Pietrit Bay.—See section 9B-6.

Gji i Durrësit.—See sections 9B-13 and 9B-6.

Kep i Palit roadstead.—See section 9B-17.

Gji i Lalza.—See section 9B-17.

PART C. KEP I RODONIT TO BOKA KOTORSKA

9C-1 **Kep i Rodonit (Cape Rodoni)** ($41^{\circ}35'N.$, $19^{\circ}27'E.$), is a narrow ridge about 98 feet high which extends from the range of Mt. Muzli (Mali Muzhllit), 675 feet high. The cape is sloping toward the southwestward and is light in color. The ridge is a good landmark as it stands out conspicuously from the low adjacent terrain. Foul ground borders the cape and depths of less than 10 fathoms extend about 2 miles west-northwestward from the cape. A light is shown on the cape.

The range of Mt. Muzli, on the southern side of the roadstead, is mostly covered by woods. It stands out among the low lands located northward and southward of it.

COAST—GENERAL

9C-2 Pellg i Drinit is an extensive eastward indentation of the coast between Kep i Rodonit and Rt Mendra, about $25\frac{1}{2}$ miles northwestward. The eastern and northern shores of the gulf are low, being formed by the deltas of the rivers Ishm, Mat, Drin, and Bojana. The low shores in the eastern part of the gulf are backed by high mountains and in the northeastern part of the gulf a mountain ridge, almost paralleling the shore, closes the coast in the vicinity of the port of Shëngjin. Ulcinj, a small harbor is located on the northern shore of the gulf.

The coast between Rt Mendra and the entrance of Boka Kotorska, about $37\frac{1}{2}$ miles northwestward, trends irregularly in a general northwesterly direction and is indented by numerous bights and bays in which small vessels may take refuge in adverse weather. The coast is ruggedly mountainous, rather precipitous in places, and backed by lofty peaks. In general, the shore is very steep-to with very few dangers, none of which lie more than $\frac{3}{4}$ mile offshore. Luka Bar and Luka Budva are the principal harbors on this stretch of coast.

DEPTHS

9C-3 Pellg i Drinit has general depths of 10 to 30 fathoms. The 10-fathom curve is charted about $\frac{1}{2}$ mile to 3 miles offshore. The shallowest water is found off the river mouths and in the bights formed between the river deltas in the eastern and southern parts of the gulf; otherwise, the depths decrease rather uniformly from the 10-fathom curve to the shore.

Between Pellg i Drinit and the entrance of Boka Kotorska the coast is mostly steep-to. Less than 1 mile offshore the depths are greater than 10 fathoms.

DANGERS

9C-4 Vessels entering Pellg i Drinit should give Kep i Rodonit a berth of at least 2 miles to avoid the shoal water that borders the cape. Inside the gulf the charted dangers all lie within the 10-fathom curve and are described with the related coastal features.

Because there are no known dangers lying more than $\frac{3}{4}$ mile offshore between Pellg i Drinit and the entrance of Boka Kotorska, the dangers along this coast will be described with the related features.

NAVIGATION

9C-5 Vessels entering the Adriatic Sea from the westward and bound for Pellg i Drinit may, after arriving at a position about 4 miles southeastward of Capo Santa Maria

di Leuca (sec. 3A-1), steer a course of 021° for about 118 miles to a position about $31\frac{1}{2}$ miles westward of Kep i Rodonit and thence proceed to the respective destination in the gulf.

From the position about $31\frac{1}{2}$ miles westward of Kep i Rodonit, a course of 331° for 24 miles leads in a least depth of 29 fathoms to a position 2 miles west-southwestward of Rt Mendra (sec. 9C-10).

Vessels proceeding northwestward along the coastal track from a position 2 miles west-southwestward of Rt Mendra may steer a course of 311° for about $37\frac{3}{4}$ miles to a position about $3\frac{3}{4}$ miles southwestward of Oštri Rt, the western entrance point of Boka Kotorska. This course clears the coast at a distance of about 5 miles and has great depths.

CURRENTS — WIND — WEATHER

9C-6 The current along this coast sets in a general northwesterly direction at a velocity of from $\frac{1}{2}$ knot to 2 knots. The current frequently sets onshore at a velocity of about $\frac{3}{4}$ knot when influenced by southwesterly winds, and even in a calm. During southeasterly winds eddies are formed off the entrance of Boka Kotorska.

Pellg i Drinit, being open to the westward, is exposed to winds from those quadrants. Winds from the west-southwestward frequently come up suddenly and raise a high sea. The bora blows with considerable violence in the gulf.

In the winter along the coast northwestward of Pellg i Drinit the bora is severe and most frequent and alternates with the scirocco, a southeasterly wind, which is more frequent in the autumn than in the winter. The scirocco is often accompanied by thick weather, making approach to the ports impracticable. Southeasterly and southwestwardly winds blow with great strength causing a heavy sea which subsides quickly. However, a southerly wind produces a rough sea that continues for some time after the wind

subsides. Northwesterly winds send in heavy seas.

COASTAL FEATURES—LANDMARKS

9C-7 Southern and eastern sides of Pellg i Drinit.—Gji i Rodonit is a small bight that lies between Kep i Rodonit and the mouth of the Ishm (Jsmi), about 6 miles eastward. Anchorage, sheltered from southwesterly winds, may be taken about 1 mile offshore in a position about $2\frac{1}{4}$ miles eastward of Kep i Rodonit, in depths of 8 to 14 fathoms, mud. A wreck lies sunk about $1\frac{3}{4}$ miles offshore in a position about $5\frac{3}{4}$ miles east-northeastward of Kep i Rodonit.

Patok, a landing place with a 300-foot pier, is located $7\frac{1}{2}$ miles east-northeastward of Kep i Rodonit. The mouth of the Mat (Matja) lies about $2\frac{1}{2}$ miles northwestward of Patok. The Drin discharges into the gulf about 11 miles northeastward of Kep i Rodonit. Mal i Veljës, 3,865 feet high, and Mal i Kalmeti, a 3,448-foot peak close northward, are located about 6 miles inland in a position about $18\frac{1}{4}$ miles northeastward of Kep i Rodonit and are useful landmarks in approaching Shëngjin.

San Giovanni Point (Kep i Shëngjin), the western entrance point of the port of Shëngjin, is located in the northeastern part of the gulf about 15 miles north-northeastward of Kep i Rodonit. The point is the southeastern termination of a mountain ridge (sec. 9C-2) that closes the shore of the gulf in this position. The point is high, rugged and rocky for about 1 mile westward of its extremity and, with the high land eastward, it forms a sharp contrast to the adjacent lowland. This contrast is a helpful guide in approaching the port of Shëngjin. A breakwater extends about 500 feet southeastward from the extremity of the point. A large yellow building with a red roof stands on the 442-foot hill about $\frac{2}{3}$ mile northwestward of the point; several other buildings stand on the point. A light is shown on San Giovanni Point. Two lights, in range 002° , lead into the port. Each light is shown from a white column with a black stripe. The rear light is close northward of the front light.

SHENGJIN

Position: 41°49' N., 19°36' E.

Depths:

Approach, 13 feet.

Harbor, 20 to 22 feet.

Pier, 19½ feet.

Roadstead anchorages, 5½ to 12 fathoms.

9C-8 The port of Shēngjīn (Port San Giovanni di Medua) is located in the north-eastern part of Pellg i Drinit immediately eastward of San Giovanni Point.

Navigation.—Vessels approaching Shēngjīn from a position about 3½ miles westward of Kep i Rodonit (sec. 9C-5), may steer a course of 036° for 16 miles to a position about ½ mile southwestward of San Giovanni Point in depths of not less than 10 fathoms. Vessels approaching the port from the northern part of the Adriatic Sea will clear all dangers and pass over depths greater than 10 fathoms by giving the northern shore of the gulf a berth of at least 2 miles.

Dangers.—A wreck lies sunk in a position about 1½ miles southward of San Giovanni Point. A wreck lies awash in the basin of the port on the northern side of the channel about 200 yards eastward of the head of the pier extending from the western shore. Another wreck lies in the middle of the basin. A narrow shoal extends about 100 yards southward from this wreck.

Depths.—In the harbor approach the depths decrease uniformly as far as a position about ¼ mile southward of San Giovanni Point, where there are depths of 7 to 8 fathoms. Inside the bight foul ground lies northward of a line from a position about 200 yards southward of San Giovanni Point to the entrance of the channel, about 600 yards eastward. Close southward of this area in the approach to the entrance of the channel there are charted depths of 3¼ to 7 fathoms. The narrow entrance channel has a depth of about 12 feet at low water. It is only about 30 yards wide and should be used only by small vessels with local knowledge. The depths in the interior of the basin are about 19½ feet.

Landmarks.—San Giovanni Point and the structures on it are conspicuous. A white wooden cross on a white stone pyramid is located on the hill about ¾ mile northeastward of San Giovanni Point.

Buoys.—The mouth of the entrance channel is marked on its eastern and western sides by cylindrical buoys. A mooring buoy is located in the southwestern part of the basin.

Anchorage.—The anchorages in the roadstead off Shēngjīn are sheltered from the bora and the scirocco. Large vessels can anchor southward of San Giovanni Point in 8 to 10 fathoms, sand, good holding ground; smaller craft can anchor more to the eastward in 5 to 6 fathoms, sand, or, if their draft does not exceed 12 feet, can safely moor in the basin.

9C-9 Shēngjīn is a small town consisting of several buildings and warehouses standing on the western side of the head of the bight. One of the buildings is used as a customhouse and health office. The port, the third largest of Albania, serves the surrounding agricultural district and the city of Shkodër (Scutari).

A wooden pier about 196 feet long extends from the shore. The depth near the pier is about 19½ feet. Depths alongside the pier range from 6½ feet to 18 feet. Two small vessels can be accommodated. Cargo is handled at this pier by two mobile cranes. A pier about 33 feet long is located at the head of the harbor.

One small tug and several lighters are available.

Provisions are procurable in small quantities. There is a small water boat with a 5-ton capacity. The water is unfit for drinking. Coastal steamers communicate with other ports in the Adriatic and Black Seas. A highway runs to Shkodër. Malaria is prevalent during summer.

COASTAL FEATURES—LANDMARKS (Continued)

9C-10 Northern side of Pellg i Drinit.—The Bojana (Buenë), the river forming the boundary near the coast between Albania and Yugoslavia, discharges into the gulf in a position about 16½ miles north-northwestward of Kep i Rodonit and 10 miles westward of Shengjin. The mouth of the river is divided into two branches. The directions of the branches are fairly constant; however,

the depths vary considerably. During some periods, navigation is by one of the branches, while the other is silted up, until the current deepens it again and it becomes navigable. The depths in the mouth depend on weather conditions. The average depth is about 5 feet, but during southerly winds it may increase to 8 to 10 feet.

Local pilots take soundings of the river daily and mark the navigable places with wooden poles. It is recommended not to rely on these markings but to make use of local pilots who may be requested from the port office at the village of Pulaj. There are depths of about 13 feet for the first 15 miles. Currents in the mouth attain rates of $1\frac{1}{2}$ to 2 knots, while in the upper parts of the river the current occasionally attains a rate of 5 knots.

Pulaj is a small village located about 1 mile inland on the eastern side of the mouth of the Bojana. It has several white houses with red roofs. A large white church stands on a small hill above the village. The village is conspicuous and makes a good landmark for approaching the Bojana. There is a small pier with a depth of 5 feet at its head. A health office is located in Pulaj. No communication is permitted with the shore and no traffic is allowed to proceed up the river until pratique is granted at Pulaj.

Sveti Nikola, another small village in which there is a church, lies on the western bank of the Bojana about $\frac{1}{2}$ mile northwestward of Pulaj. A 102-foot hill rises above the surrounding trees in a position about 1 mile west-northwestward of the village. It is covered with conspicuous large bare patches of red earth.

Anchorage, sheltered from offshore winds, may be taken off the mouth of the Bojana. Large vessels can anchor south-southwestward of the Albanian Office of Health in 7 fathoms, mud; smaller craft can anchor closer to the mouth of the river.

Directions.—Approaching the eastern mouth of the river, a vessel should steer for the church at Sveti Nikola bearing 000°; approaching the western mouth, the vessel should steer for the church bearing 068°.

Caution—Pilots required along the Yugoslav coast.—Pilotage is compulsory for all vessels over 500 gross tons, except local coasting vessels, navigating the coastal waters and harbors along the Yugoslav coast. The nearest pilot station is at Boka Kotorska. For details and pertinent regulations, see sections 1-18 and 9D-7.

Hrid Deran (Guri Geranis), a red-colored rock 13 feet high, lies about 1 mile offshore in a position about $3\frac{1}{2}$ miles west-northwestward of the Bojana. A rock, with a depth of 5 feet, lies about 330 yards south-southwestward of Hrid Deran. A dangerous wreck lies about $1\frac{1}{2}$ miles eastward of Hrid Deran.

Luka Ulcinj is a small harbor on the northern shore of Pellg i Drinit about $7\frac{1}{2}$ miles northwestward of the Bojana and about 3 miles southeastward of Rt Mendra. The coast in the vicinity of Ulcinj between Rt Mendra and Rt Deran (Derana Point), about 5 miles southeastward, is hilly, attains elevations of about 200 to over 500 feet, and presents a contrast to the lowlands eastward of Rt Deran. The walled town of Ulcinj surrounds the harbor in the form of an amphitheater. A light is shown on the ruins of a fort on the western side of the harbor entrance.

This small harbor affords shelter to small vessels with local knowledge during a bora or northwesterly winds, but being open to the southward, is exposed to winds from those quadrants. The 5-fathom curve is charted about 300 yards seaward of the harbor; in the harbor entrance the depth is about $16\frac{1}{2}$ feet. Small vessels with a draft of 10 feet can safely approach and berth at the small quay on the western side of the entrance. A mooring buoy is located near the middle of the harbor entrance.

Caution.—Vessels approaching the quay in the harbor should give the western entrance point a fairly good berth to avoid the rocks nearby.

Pilotage is compulsory. Pilot must be requested from Bar (sec. 9C-12), 24 hours in advance.

Anchorage.—There is anchorage, sheltered from the bora, about 700 yards south-

ward of the harbor entrance in depths of 10 to 12 fathoms, mud and sand, good holding ground.

Ulcinj is a town with a population of about 3,700. The quay, suitable for small vessels, is about 118 feet long and has $9\frac{3}{4}$ to $13\frac{1}{2}$ feet alongside. Provisions and water are available. Small coastal steamers call from other Yugoslav ports; the town has telephone and telegraph services. A good road leads to the town of Bar. Medical attention and medical supplies are available. A light is shown at Ulcinj.

Melina, located on the mouth of a small river at Rt Deran, is a small harbor used as an outlet for the salt works in the vicinity. There is a small wooden pier suitable only for barges.

Rt Mendra (Rt Mendre) ($41^{\circ}57'N.$, $19^{\circ}09'E.$) is steep-to, covered with shrubs, and rises to a hill, 403 feet high, about $\frac{3}{4}$ mile east-southeastward of its extremity. A light is shown on the point.

Uvala Orašac (Uvala Valdanos) (Noce Bay), a small cove open to the west-northwestward, lies immediately northward of the projection of which Rt Mendra is the extremity. The northern shore of the cove rises to a height of 1,240 feet. The ruins of a harbor master's office stand on the beach at the head of the cove. There is a small quay, used by fishermen, on the southern shore. A wreck lies stranded near the head of the cove. There are depths of $6\frac{1}{2}$ to $8\frac{1}{2}$ fathoms in the middle of the cove, gradually decreasing toward the head of the cove. Small vessels with local knowledge may take anchorage about 700 yards east-northeastward of the light structure on Rt Mendra, in $6\frac{1}{2}$ to $8\frac{1}{2}$ fathoms, mud and weed, good holding ground, or farther inshore.

9C-11 Otočić Stari Ulcinj, a small islet separated from the mainland by foul ground, lies about 300 yards offshore near the northern entrance point of Uvala Kručī, a small cove lying northward of Uvala Orašac. The islet is 144 feet high and has the ruins of a building standing on it.

Rt Volovica, the southern entrance point of Barsko Sidrište, is the northwestern extremity of a projection on the coast about 9 miles north-northwestward of Rt Mendra. A narrow tongue of foul ground, with depths of less than 6 fathoms, extends about 150 yards northwestward from the point. An old fort stands near the point. A light is shown on the point.

A small red buoy is moored about $3\frac{1}{2}$ miles southward of Rt Volovica.

Barsko Sidrište (Bar Roads).—The coastal indentation between Rt Volovica and Crni Rt, about $3\frac{3}{4}$ miles northwestward, forms several small bays. Barsko Sidrište, the southern bay, lies between Rt Volovica and Rt Rotac, a small projection about 2 miles northward. Some ruins stand on the latter point. The northeastern shore of the bay is bold and rises to Mount Petilje, 2,345 feet high, about $1\frac{1}{4}$ miles northeastward of Rt Rotac. Fort Sušan, 1,023 feet above the sea, stands on the high land overlooking the bay about $\frac{1}{2}$ mile southwestward of Mount Petilje. There is a sandy beach on the southern and eastern shores of the bay.

LUKA BAR

Position: $42^{\circ}05'N.$, $19^{\circ}05'E.$

Depths:

Bay, 5 to 11 fathoms.

Anchorage, 7 to 9 fathoms.

Quay, 16 to 24 feet.

Tidal range: Mean, 0.7 foot; Spring, 1 foot.

9C-12 Luka Bar is located in the southern part of Barsko Sidrište about 34 miles northwestward of Kep i Rodonit.

Navigation.—Vessels bound for Luka Bar from a position on the coastal track 2 miles west-southwestward of Rt Mendra (sec. 9C-5) may steer a course of 345° for $9\frac{1}{4}$ miles to a position about $\frac{3}{4}$ mile westward of Rt Volovica.

Vessels approaching from the northwestward may steer directly toward the bay after passing Crni Rt. Rt Rotac should be given a berth of at least 200 yards to avoid the reef that borders that point.

Winds.—The bay is open to the westward and winds from those quadrants raise a high sea. The strongest winds are off the mountains, but they do not raise a sea; however, when the bora blows from the northeastward there is a heavy swell in the bay. Northwesterly winds are weak in the winter. In the summer there are violent squalls of short duration from the northwestward.

Depths.—The approach to the port is deep, with a depth of 59 feet in the entrance. General depths in the port range from 22 to 39 feet.

Landmarks.—The high mountainous land that backs Barsko Sidrište is useful in approaching Luka Bar. Mount Lisen (Lissen), 4,432 feet high, Mount Rumija (Rumia), 5,226 feet high, and Mount Kunore (Kosa), 3,898 feet high, are located several miles inland in positions about 7, $9\frac{1}{4}$, and $12\frac{1}{4}$ miles, respectively, northward of Rt Mendra.

Harbor.—A breakwater, quayed on its eastern side, extends about 1,400 yards north-northeastward from the shore 400 yards east-southeastward of Rt Volovica. Another breakwater extends about 900 yards westward from the shore 1 mile northeastward of Rt Volovica. A light is shown on the head of the western breakwater. A light is shown on the northern breakwater.

Anchorage.—Good anchorage can be taken in 7 to 9 fathoms, mud, about $\frac{1}{2}$ mile offshore in a position with the lighthouse on Rt Volovica bearing 231° , distant about $\frac{1}{2}$ mile. Small vessels may anchor farther inshore and take advantage of the shelter afforded by the mole. Vessels must be prepared to take every precaution on the usual indications of adverse weather from the westward.

Pilotage is compulsory. There is a day and night service. Pilots board outside the breakwater. Pilots must be requested 24 hours in advance.

9C-13 Bar, a village with a population of about 1,400 in 1955, is located close eastward of the mole.

Stari Bar, a town with a population of about 5,000, stands on the hill about 3 miles eastward of Rt Volovica. There are customs and harbor officials in the village. Provisions are available. The village has telephone and telegraph services. A narrow gauged railroad runs to Virpazar. Coastal steamers call from other ports in the Adriatic Sea. The sanitary condition of the village is good. Medical supplies and medical attention are available.

The quayed eastern side of the western breakwater has 26½ feet alongside the inner part. The breakwater is connected to the railroad system.

A pier, 110 yards long, extends southward from the north breakwater with depths of 22 feet alongside.

A pier, about 340 yards long, with 32½ feet alongside, extends westward from the shore. In 1964 another pier was under construction close southward.

The port has cranes of 3- to 5-ton capacity, and a 60-ton floating crane.

The port has 3 mobile cranes of 5-ton capacity.

COASTAL FEATURES—LANDMARKS (Continued)

9C-14 Spičanski Zaliv, a small bay, lies in the eastern part of the larger bay formed between Rt Rotac and Crni Rt, about $2\frac{1}{2}$ miles west-northwestward, and together with Uvala Malevik (Meljevik), a small bight immediately eastward of Crni Rt, comprises the northern portion of the coastal indentation between Rt Volovica and Crni Rt. There are general depths of 6 to 15 fathoms in the bay and at no position along the shore does the 6-fathom curve lie more than 500 yards offshore. The village of Sutomore is located on the northern shore of Spičanski Zaliv and close southwestward of the village a battery stands on a 288-foot hill. Uvala Malevik, open to the southward, is obstructed by foul ground on its eastern and northern sides. Anchorage for small vessels is available about 700 yards offshore midway between Rt Rotac and the village of Sutomore, in 9 fathoms, sand. This anchorage is exposed to onshore winds; the bora is very strong.

Crni Rt is a bold and steep-to headland, 515 feet high, located about $12\frac{1}{4}$ miles north-northwestward of Rt Mendra. Uvala Čanj.

a cove that affords shelter from northwesterly winds to small craft, lies about $1\frac{1}{4}$ miles northward of Crni Rt.

Rt Dubovica, a poorly defined but rather precipitous point, rises to an elevation of 1,030 feet about 3 miles northwestward of Crni Rt. Hrid Mravinjak, an above-water rock, lies on foul ground that extends about 200 yards seaward from the point.

Uvala Petrovac ($42^{\circ}12'N.$, $18^{\circ}56'E.$) is a small harbor nearly midway between Rt Dubovica and Rt Skočidevojka, about 4 miles northwestward in which stands the town of Petrovac. A light is shown about 400 yards southwestward of the belfry of the church in the town. The ruins of a castle encircle the western shore of the harbor.

There are sufficient depths in the channel until the vessel is about 1,300 to 1,640 feet from the quay where the depths are 5m (16 $\frac{1}{2}$ ft.) to 7.9m (26 ft.). The quay has a depth of about 4.5m (15 ft.) at its northern end, and 5m (16 $\frac{1}{2}$ ft.) at the southern end.

A shoal bank, on which are several islets, lies about $\frac{1}{3}$ to $\frac{3}{4}$ mile southward of the harbor. Hrid Sveta Nedelja, the northernmost islet has a white chapel on its 108-foot summit. Hrid Katic consisting of two islets, lies close southward of Hrid Sveta Nedelja. A steep-to reef, with a depth of about 0.3m (1 ft.), extends about 400 yards south-southeastward from Hrid Katic. A stone quay, about 164 feet long, is at the head of the harbor. Vessels should keep well clear of the southern end of the quay where there is a large rock in a depth of about 4.5m (15 ft.). The harbor is open and exposed to winds from south through west to north-northwest. When the wind is toward the land, vessels are forced to put to sea, or shelter at the anchorage at Bar. Vessels bound for Petrovac take a pilot at Bar and also clear there. Pilots must be requested 24 hours in advance. When approaching the harbor, steer about northeast to pass about midway between Hrid Sveta Nedelja and the western shore. Some provisions are available.

Rt Skočidevojka, a rather precipitous point, is fringed by a reef that extends about 100 yards offshore. In bad weather the sea breaks over this reef.

LUKA BUDVA AND ADJACENT BAYS

9C-15 General remarks.—The north-west-trending coast between Rt Skočidevojka and Rt Platamon, about $6\frac{1}{2}$ miles west-northwestward, recedes about 3 miles north-eastward and forms along the northern shore several distinct bays. Good anchorages are located in some of these bays. Luka Budva, lying near the head of this indentation, is fronted by a rugged island. The eastern shore of the indentation is rather bold and steep-to with the exception of a few above-water rocks lying close offshore and some reefs fringing the shore in places. The northern shore has high hills with sharp peaks sloping to deep troughs and is backed by high mountains in the interior.

Landmarks.—Mount Lovćen, 5,770 feet high and the highest peak along this stretch of coast, is located about $16\frac{1}{2}$ miles north-northwestward of Rt Skočidevojka. A radio tower is located on Mt. Lovien. From the southward this summit presents the aspect of being the western extremity of the high mountain range that backs this coastal indentation. Mount Spas, about $5\frac{1}{4}$ miles northward of Rt Skočidevojka, rises to a well-defined peak, 1,276 feet high, close westward of the town of Budva and makes a good landmark in approaching Luka Budva.

Depths.—Excepting the depths in the bays and the dangers on the western side of Otočić Sveti Nikola, described below, this coastal indentation has general depths of 21.9m (12 fm) to 50 m (27 fm). The 10-fathom curve lies about 200 to 400 yards off its eastern shore.

Sveti Stefan is a village situated on a small rocky peninsula that is connected to the mainland by a low narrow neck of land about $2\frac{1}{4}$ miles north-northwestward of Rt Skočidevojka. On the northern side of the peninsula there is a small quay, with a depth of 3m (10 ft.) alongside. Hrid Golubinj, a steep-to rock, lies about 600 yards south-southeastward of Sveti Stefan. Small vessels with local knowledge may anchor in the bights on either side of the peninsula, in sand and weed, good holding ground.

Otočić Sveti Nikola, about 1 mile long, northwest and southeast, and 397 feet high, lies with its southern extremity about $3\frac{1}{4}$

miles northwestward of Rt Skočidevojka. A chapel stands on the northern end of the island. The western side of the island is precipitous, has two detached above-water rocks close southwestward of its northern extremity, and is bordered by foul ground extending about 200 yards seaward. A reef that breaks occasionally lies about 250 yards offshore and about 400 yards northwestward of the southern extremity of the island; two detached shoals, with depths of less than 2.4m (8 ft.) lie about 100 and 300 yards, respectively, northwestward of the reef.

The eastern side of Otok Sveti Nikola has cultivated slopes. An 2.4m (8 ft.) shoal lies about 400 yards eastward of the northern extremity of the island. Two shallow rocky ridges, described below, extend northward and northwestward from the northern extremity of the island and form Luka Budva.

A light is shown on the southern extremity of Otok Sveti Nikola. A light is shown about $3\frac{1}{2}$ miles westward of the above light.

Uvala Mala Luka, entered between Svet Stefan and the southern extremity of Otok Sveti Nikola, lies between that island and the mainland northeastward. The bay is free of dangers and has general depths of 16.5m (9 fm) to 29m (16 fm); the 6-fathom curve lies from 200 to 600 yards offshore. Rt Zavala, the southern extremity of a projection extending from the head of Uvala Mala Luka, lies about $\frac{2}{3}$ mile east-northeastward of the northern end of Otok Sveti Nikola. The ruins of a fort stand on the point. Zavala Bay is the northwestern extension of Uvala Mala Luka.

Anchorage is prohibited in Uvala Mala Luka.

9C-16 Luka Budva.—This small harbor is formed by two narrow and shallow rocky

ridges extending about $\frac{3}{4}$ mile northward and about $\frac{1}{2}$ mile northwestward, respectively, from the northern extremity of Otok Sveti Nikola to the mainland. The foul ground of the eastern ridge, which breaks occasionally, forms a natural breakwater that protects the harbor somewhat from a southerly swell. At its northern extremity, very close to the shore, there is a passage, with a fairway depth of 5.8m (19 ft.), marked by a beacon on either side. The northwestern ridge joins the coastal bank off the town of Budva and has a passage, with a depth of 3.6m (12 ft.), marked on its northern side by a red conical light buoy. Range lights for this latter passage are located on the northern shore of the harbor, bearing 013°. A vessel entering the harbor should steer on the range lights, passing the buoy close aboard to port.

Depths in the port area between the two ridges and the coastal bank are 5.5m (3 fm) to 10.1m (5 $\frac{1}{2}$ fm). Inside the protected harbor the depths are 2.7m (9 ft.) to 4.9m (16 ft.).

The harbor lies on the northern side of the promontory on which stands the town of Budva and is enclosed by two moles. The eastern mole extends about 80 yards northward from the northeastern extremity of the promontory and the northern mole extends about 150 yards east-southeastward from the shore about 200 yards northward of the town. A breakwater, marked by a light, extends about 85 yards eastward from the middle of the eastern mole. There are several mooring buoys in the harbor. A quay on the northern shore has 1.8m (6 ft.) alongside and is suitable only for small craft.

Anchorage is prohibited in Luka Budva.

Pilotage is compulsory. Pilot must be requested from Bar (sec. 9C-13), 24 hours in advance.

Caution.—Although Luka Budva is sheltered from winds from the southeast through southwest, it is dangerous to attempt entry into the port area and the harbor during strong winds from these quarters as heavy seas break over the bar on the ridge. The port is exposed to the bora.

9C-17 Budva, a walled town with a population of about 475, occupies the small promontory on the southwestern side of the harbor. A church, with a conspicuous belfry, dominates the town. Budva has telephone and telegraph services. Coastal vessels call from other ports in the Adriatic Sea. A good road leads to Bar and Kotor. Limited medical attention and medical supplies are available.

Uvala Jaz and **Uvala Trsteno**, both open to the southward, indent the coast westward of Luka Budva between Rt Mogren, the southeastern termination of Mount Spas (sec. 9C-15), and Rt Platamon, about $2\frac{1}{4}$ miles westward. Rt Jaz (Trsteno Point) lies midway between the above-mentioned points and separates the bays. A dangerous wreck lies about 300 yards southwestward of Rt Jaz. Uvala Jaz, the eastern bay, affords shelter from winds of the northern quadrants. Southerly winds send in heavy seas. Vessels should leave at once at any indication of wind from that quarter. Shoal water, with depths of less than 6 fathoms, lies within about 200 yards of the shores and within about 600 yards of the head of the bay. An above-water rock lies about 200 yards off-shore in the northeastern part of the bay. In a bora, vessels can find sheltered anchorage, in depths of about 4 to 11 fathoms, sand, good holding ground, off the northeastern shore under Mount Spas with shore fasts

to stone bollards. Uvala Trsteno, fairly steep-to, affords shelter from northerly winds in its innermost parts. Southeasterly winds send in heavy seas.

COASTAL FEATURES—LANDMARKS (Continued)

9C-18 Rt Platamon ($42^{\circ}16' N.$, $18^{\circ}47' E.$), a rounded point on which a light is shown, is located about $25\frac{1}{4}$ miles northwestward of Rt Mendra.

The coast between Rt Platamon and Rt Arca (sec. 9D-8), the eastern entrance point of Boka Kotorska about 12 miles northwestward, is indented by one large bay, Zaliv Traste, and by numerous small bays and bights. The coast is bold and steep-to. Anchorages are available in some of the bays.

Rt Žukovac, a high point, lies about $4\frac{1}{2}$ miles northwestward of Rt Platamon. Near the shore about midway between these two points there is a conical hill, 1,007 feet high, and the conspicuous belfry of a chapel about 1 mile west-northwestward.

Greben Kamenik (Albaneze Rock), which breaks only during heavy weather, lies about 800 yards northwestward of Rt Žukovac. This nearly steep-to rock is marked by a beacon and should be given a wide berth.

Zaliv Traste.—The coast between Rt Žukovac and Rt Kupa, about 4 miles northwestward, recedes very irregularly in a general northerly direction and forms at its head Zaliv Traste. The entrance of this bay, about $1\frac{1}{2}$ miles wide, lies between Rt Traste and Rt Kočište, located about $2\frac{1}{4}$ miles north-northwestward and $3\frac{1}{2}$ miles northwestward, respectively, of Rt Žukovac. A low isthmus at the head of Zaliv Traste connects the hilly peninsula that forms the western side of this bay with the high land southeastward of it, which rises to a conspicuous peak, 1,345 feet high, at Mount

Prčja Glava (Prčija), about $2\frac{1}{4}$ miles east-southeastward of Rt Traste. Velović Brdo, 736 feet high, and Mount Radišević, 890 feet high and with a fort on it, stand out conspicuously against the low isthmus in positions about $1\frac{1}{4}$ miles northward and $2\frac{1}{2}$ miles northwestward, respectively, of Rt Traste.

A light is shown from a white iron framework tower, 21 feet high, on Rt Traste.

The bay is open to the southward and has general depths of 7 to 17 fathoms. A spit with a depth of 11 feet extends north-northwestward from Rt Traste, and a 7-fathom rocky patch lies about $1\frac{1}{2}$ mile east-northeastward of Rt Kociste. An obstruction lies about $1\frac{1}{2}$ miles southwestward of Rt Traste. Passage and fishing in the vicinity of the obstruction are prohibited.

Uvalica Bigova, at the head of which is the village of Bigova (Traste) and Sveti Nikola Church, is a small cove located in the southeastern corner of Zaliv Traste immediately northeastward of Rt Traste. Anchorage, protected from the bora, southerly and southwesterly winds, can be taken in 8 or 9 fathoms, sand, about 700 yards northeastward of Rt Traste. Smaller vessels may anchor near the head of the cove, in $3\frac{1}{4}$ to $5\frac{1}{2}$ fathoms, sand and weed, good holding ground. During a bora, shore fasts are used. A light is shown on a wharf at Bigova.

Dobra Luka, open to the southward, indents the coast between Rt Kočište and Rt Kupa, about 1 mile westward, and is sheltered somewhat from northwesterly winds and the bora. Anchorage may be taken in the northeastern part of this bight in 6 to 11 fathoms, sand and weed.

ANCHORAGES

9C-19 Pell i Drinit:

Eastward of Kep i Rodonit.—See section 9C-7.

Shëngjin Roadstead.—See section 9C-8.
Off the Bojana entrance.—See section 9C-10.

Luka Ulcinj.—See section 9C-10.

Uvala Orašac.—See section 9C-10.

Barako Sidrište.—See section 9C-12.

Spičanski Zaliv.—See section 9C-14.

Sveti Stefan.—See section 9C-15.

Uvala Jaz.—See section 9C-17.

Zaliv Traste.—See section 9C-18.

PART D. BOKA KOTORSKA

GENERAL REMARKS

9D-1 Boka Kotorska (Gulf of Kotor) (entrance, $42^{\circ}24' N.$, $18^{\circ}33' E.$) is a large almost landlocked body of water that has access to the sea through a comparatively narrow entrance between Rt Mirište (Arca) and Ostri Rt. The gulf is surrounded by high mountains and from its entrance extends interveningly between the irregular mountain chain for a distance of about 16 miles. It comprises several spacious, deep, and well-sheltered bays that are separated by constricted passages. In the order of entrance, the following are the major bays: Topaljski Zaliv, in which are the harbors of Hercegnovi (Ercegnovi), Meljine, and Zelenika; Tivatski Zaliv, including two smaller bays and the harbor of Tivat; Morinjski Zaliv; Risan-ski Zaliv, with the harbor of Risan; and Kotor-ski Zaliv, at the head of which is the harbor of Kotor. For the purposes of a large fleet, the gulf is surpassed by but few ports in the Mediterranean Sea.

NAVIGATION

9D-2 Vessels entering the Adriatic Sea from the westward and bound for Boka Kotorska may, from a position about 2 miles eastward of Capo di Otranto (sec. 3A-5), steer a course of 360° for about 137 miles to a position at the entrance of Boka Kotorska. Vessels entering the Adriatic Sea from the southeastward may, after arriving at a posi-

tion about $6\frac{3}{4}$ miles southwestward of Nisos Othonoi (sec. 8-2), steer a course of 348° for about 161 miles to a position at the entrance of Boka Kotorska. Both of these courses lead over great depths and are free from any dangers.

Vessels proceeding from the southward along the coastal track and bound for Boka Kotorska may, after arriving at a position about 2 miles west-southwestward of Rt Mendra (sec. 9C-5), steer a course of 317° for about 87 miles to a position about 1 mile southward of the entrance of Boka Kotorska. This course leads over great depths and passes about $2\frac{3}{4}$ miles west-southwestward of Rt Platamon and $1\frac{3}{4}$ miles west-southwestward of Rt Kupa. Vessels approaching Boka Kotorska from the northwestward will encounter no dangers as the coast is very steep-to.

Navigation within Boka Kotorska is given in general directions in section 9D-24.

CURRENTS—WEATHER

9D-3 Off the entrance of Boka Kotorska the coastal current is deflected by an outset caused by southeasterly winds, which set the water towards the shore and cause eddies. In the gulf the currents are very irregular and largely influenced by tides and the direction and strength of the wind. After heavy rains the currents attain a velocity of 2 to more than 3 knots and at other times the velocity is about $\frac{3}{4}$ knot. In the summer the currents are very weak. In the entrance of the gulf the currents set to the northwestward along the eastern shore and southeastward along the western shore, frequently attaining a velocity of $2\frac{1}{2}$ knots in either direction. In the narrows of Kumbur the current usually sets to the westward and is very strong, but in Verige the current is variable in direction and never exceeds a velocity of $1\frac{1}{2}$ knot under normal conditions.

The bora and the scirocco occur more fre-

quently during the winter than in the summer and are dangerously sudden, blowing with great violence down the slopes through the gorges in the surrounding mountains of the gulf. During the winter the bora blows from the northward and northeastward and is accompanied by fog, snow, and sudden changes of temperature. The scirocco, a warm wind, blows from the south-eastward and brings fog and rain. Southerly and southwesterly winds send a heavy sea into the entrance of the gulf and into the western part of Topaljski Zaliv. In the winter it is always difficult to distinguish the high land about the entrance during southeasterly, southerly, or southwesterly winds.

DEPTHS—DANGERS

9D-4 In general, the depths in the approaches, the entrance, and within Boka Kotorska are sufficient to accommodate the largest vessels. The shores are steep-to with but few dangers. The dangers are described with the related features. In the entrance of the gulf the depths decrease from 35 to 13 fathoms; within the bays the depths vary non-uniformly from 10 to 25 fathoms.

An isolated rocky patch, with a depth of $6\frac{1}{2}$ fathoms, lies in the entrance in a position about 1 mile north-northeastward of Oštri Rt (sec. 9D-8).

Danger area.—A firing range lies off the entrance of Boka Kotorska in a triangular area with Rt Mirište as an apex and lines drawn in a 270° direction $16\frac{2}{3}$ miles and a 220° direction 15 miles, respectively, from the point. During firing practices, three red balls, indicating vessels must clear the area, are displayed vertically from a mast on the tower on Rt Mirište (sec. 9D-8).

Explosives dumping ground.—An explosives dumping ground, consisting of a circular area with a radius of 2 miles, lies about 15 miles southward of the entrance of Boka Kotorska.

ASPECT—LANDMARKS

9D-5 The mountains behind Boka Kotorska stand out prominently in clear weather and are excellent landmarks in approaching the gulf. From the offing to the southward, Mount Radoštak, 4,744 feet high, and Mount Dobrostrica, a 5,150-foot peak close west-northwestward, are seen backing the entrance of the gulf in a position about 6 miles northward and about $7\frac{1}{4}$ miles north-northwestward, respectively, of Rt Mirište. Mount Lovćen (sec. 9C-15), 11 miles eastward of Rt Mirište, is saddle shaped and conspicuous when approaching this coast from any direction. From the offing to the westward, Mount Radoštak is seen to the northward of the entrance of the gulf and Mount Lovćen appears to aline with the entrance points. Upon close approach, the coastal delineation of the entrance becomes distinct and with the aid of several landmarks, described below, the entrance is readily identified.

RESTRICTIONS

9D-6 Submarine cables.—Submarine cables are laid in Tivatski Zaliv (sec. 9D-14), a part of Topaljski Zaliv. and the entrance of Boka Kotorska.

Prohibited anchorages.—Anchoring and trawling are prohibited in the firing area except at Hercegnovi (sec. 9D-9). Anchorage is also prohibited in the following areas:

- (1) Kumbur.
- (2) The heads of Krtolski Azliv and Uvala Kukuljina.
- (3) Off the naval base of Tivat, except under stress of weather, and then only by permission of the naval authorities. (The limits of this area are not indicated on the chart.)
- (4) Verige.

- (5) In Kotorski Zaliv between the northern end of Verige and the vicinity of the village of Perast.

- (6) Near any submarine cable.

A charted area in which stopping or anchoring is prohibited extends up to about 8 miles offshore from between Luka Mali Molunat (sec. 9E-6) and Rt Kociste (sec. 9C-18).

Regulations.—Vessels must not clean or stoke fires nor use forced draft within a radius of 550 yards of the following places:

- (1) Firing range in the vicinity of Rt Mirište.
Military zones at:
- (2) Pristan, on the southern side of Kumbur.
- (3) Petrovići, on the southern side of Tivatski Zaliv.
- (4) Between Rt Opatovo and Lastva, on the eastern side of the southern approach to Verige.
- (5) Northward of Lepetane, on the eastern side of Verige.

Vessels are forbidden to pass within 220 yards of positions (1) to (4). Vessels passing position (5) should keep as near to the opposite side of the channel as safe navigation permits.

General anchorages.—With the exception of the entrance and the restricted areas, all of the bays in the gulf afford good anchorage even for the largest vessels. However, caution is necessary when selecting an anchorage berth because of the suddenness and violence of the squalls that enter the gulf from the northward and eastward. In general, during a bora or a scirocco the preferred anchorage is under the eastern shore of the gulf. Near the middle of the bays the bottom is generally mud, but nearer the shores the mud is mixed with sand and shells.

PILOTS

9D-7 Pilotage is compulsory for all vessels over 500 gross tons except local coasters entering Boka Kotorska. Pilots board about $1\frac{1}{2}$ miles southward of Rt Miriste, or at the anchorage of Zelinika, and are available day or night. A pilot should be requested through Dubrovnik radio station ORS.

ENTRANCE OF BOKA KOTORSKA

9D-8 The entrance of Boka Kotorska, about $1\frac{2}{3}$ miles wide, lies between Rt Miriste and Oštri Rt and extends about 2 miles northward to Topaljski Zaliv. Both sides of the entrance are high and steep-to, the shores being inaccessible, rocky and covered with brushwood. Excepting the $6\frac{1}{2}$ -fathom rocky patch described in section 9D-4 and Otočić Lastavica, described below, the entrance is free from dangers. The town of Hercegnovi, standing on the sloping mountainside of the northern shore of Topaljski Zaliv about $3\frac{1}{2}$ miles northward of the entrance and makes an excellent landmark for entering the gulf.

Rt Miriste, the eastern entrance point, is a small and low projection. The tower of an old fort stands on the extremity of the point. Signals (sec. 9D-4) are displayed from a mast on the tower during firing practice. Close northward of the point there is a low rock on which are some ruins and a chapel.

Luka Zanjica, a small cove about $\frac{1}{2}$ mile northward of Rt Miriste, is sheltered from southerly winds but exposed to northwesterly and southwesterly winds, and, as such, affords anchorage in a depth of about 4 fathoms, sand, good holding ground, about 350 yards from its head.

Otočić Lastavica (Otočić Mamula) (Rondoni Rock), 50 feet high, lies on the eastern side of the entrance of the gulf about $\frac{1}{2}$ mile west-northwestward of Rt Miriste. The islet is steep-to and surmounted by a fort. A light is shown on the fort.

Oštri Rt, the western entrance point, is located about $1\frac{2}{3}$ miles westward of Rt Miriste. This precipitous point, 207 feet high and steep-to, is the extremity of a narrow rocky peninsula that extends about $1\frac{1}{2}$ miles southwestward from the mainland. A light is shown on the summit of the point. A signal station, connected with the telegraph system, stands near the light structure.

Caution.—In the northern part of the entrance of the gulf between Rt Kobila and Rt Luštica (Rt Dobreč), located almost 2 miles northward and about $1\frac{1}{4}$ miles northward and about $1\frac{1}{4}$ miles north-northeastward, respectively, of Oštri Rt, the northwest-going and southeast-going currents meet and, with southerly winds, there is a heavy sea.

TOPALJSKI ZALIV

9D-9 Topaljski Zaliv (Topla Bay), the westernmost bay of Boka Kotorska, lies immediately northward of the entrance of the gulf and is entered between Rt Kobila and Rt Kabala, a rounded point about $\frac{3}{4}$ mile east-southeastward. The bay, about $3\frac{1}{2}$ miles long, east and west, is surrounded by high land. The northern shore rises gradually to the coastal range of which Mount Dobrostrica and Mount Radoštak (sec. 9D-5) are the summits. The southwestern and southeastern sides of the bay consist of moderately steep hills. There are numerous settlements along the shores of the bay, but only the harbors of Hercegnovi, Meljine and Zelinika, located on the northern shore, are of commercial importance.

The western part of the bay, fronting the low and marshy valley of the Sutorina River, is an extensive shoal area, with depths of less than 6 fathoms, that extends up to $\frac{3}{4}$ miles from its head. Elsewhere in the bay there are depths of 6 to 24 fathoms. The shores are rather steep-to and the 5-fathom curve is charted from less than 100 to about 400 yards offshore.

Luka Roze, a small cove about $\frac{1}{2}$ mile northeastward of Rt Kabala, affords shelter from southerly winds to small vessels with local knowledge in a depth of about 6 fathoms, mud, about 100 yards from its head. There is a mooring buoy in the cove. The small village of Roze is situated at the head of the cove. It has a small quay that can accommodate small craft.

A light is shown on the quay at Luka Roze.

Luka Hercegnovi, about $1\frac{1}{2}$ miles northward of Rt Kobilja, is a small harbor formed by a breakwater extending about 200 yards westward from the shore and a jetty extending about 100 yards south-southeastward from the shore north-northeastward of the head of the breakwater. The breakwater can accommodate small vessels along its quayed northern side where there is a depth of 3 to 16 feet alongside for the inner 200 feet, 16 to 24 feet alongside for the next 200 feet, and 24 to 29 feet alongside for the outer 240 feet, which was reported to be under construction in 1959. Lighters use the jetty where the depths are 3 to 16 feet. In the harbor entrance the depths vary from 20 to 27 feet.

A light is shown on the head of the breakwater.

There is a boat landing with steps that lead to the railroad station.

Dangers. — Below-water rocks extend about 33 feet westward from the head of the breakwater. Vessels are cautioned to give these rocks a wide berth when entering the harbor. Hrid Karatoč, a dark jagged rock, lies on the outer end of a shoal spit in a position about 300 yards southeastward of the head of the breakwater.

Current. — During southerly winds or heavy rain there is quite a strong westerly current setting across the harbor entrance which causes an ebb from the harbor.

Hercegnovi, a picturesque town with a population of about 1,500 in 1953, lies on the sloping mountainside northeastward of the harbor in the form of an amphitheatre. It stands out conspicuously amidst beautifully terraced gardens. A church belfry and a mon-

astery about 600 yards westward, are conspicuous landmarks. Provisions can be obtained. There are several lighters. The town has telephone, telegraph, and railroad services. There is a small shipyard here where small craft of about 165 feet and 450 tons can be built. Good roads lead to Dubrovnik and, via Kotor, to Setinje.

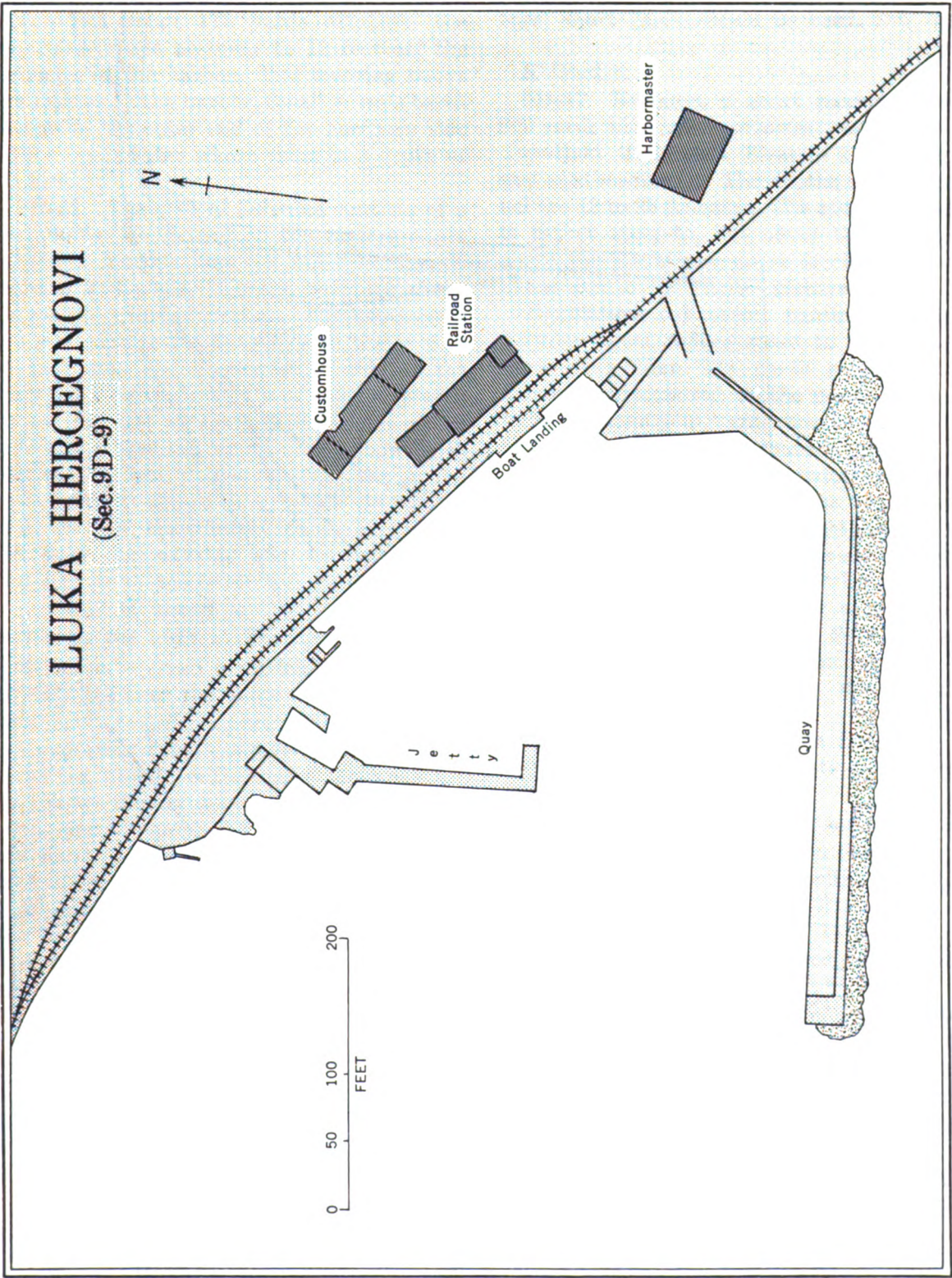
9D-10 Uvala Meljine, a small coastal indentation in the northeastern part of Topaljski Zaliv, lies about 1 mile eastward of Luka Hercegnovi and provides the best anchorage in the bay. The naval hospital and Savina Monastery, near the western entrance point of this small bay, and a large castellated hotel at Umac, on the northeastern shore, and Trojica Church, about $\frac{2}{3}$ mile east-northeastward, are good landmarks.

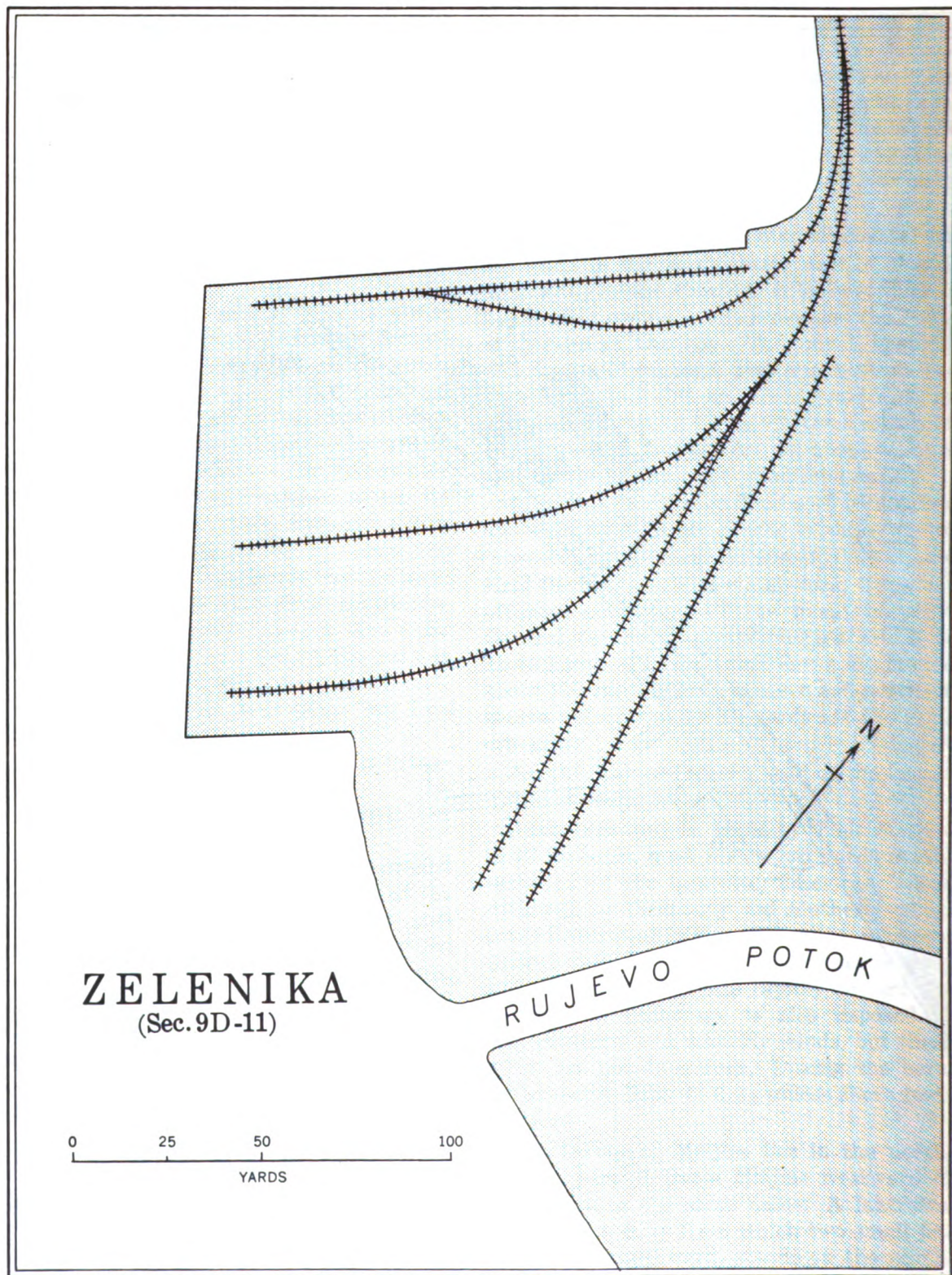
A coastal bank, with depths of 5 fathoms and less, extends about 400 yards offshore between Luka Hercegnovi and Uvala Meljine. Hrid Savina, an above-water rock, lies close offshore southward of the naval hospital. General depths in Uvala Meljine are 6 to 12 fathoms. The 5-fathom curve is charted about 180 yards off the western and northern shores but only about 50 yards off the eastern shore.

A light is shown on the head of the breakwater at Meljine.

Anchorage may be taken in Uvala Meljine in 12 fathoms, mud, about 700 yards southeastward of the lazaretto, described below. Although southeasterly and southerly winds cause heavy seas in this anchorage, it is considered safe as the holding ground is good and the depths decrease rapidly toward the shore. The anchorage is also exposed to northwesterly and westerly winds, but these winds are not dangerous. During the bora, the anchor is liable to drag unless shore fasts are used.

The harbor of Meljine lies in the northwestern part of Uvala Meljine westward of the village of the same name. A lazaretto, fronted by a quay from which two small jetties extend southward, stands on the northern shore. A small breakwater extends about 170 feet east-northeastward from the western shore a short distance southwestward of





the lazaretto. From the 5-fathom curve, which lies about 175 yards offshore, the depths decrease abruptly to 12 feet off the entrance of the harbor. Two mooring buoys are located in the harbor. Small vessels berth alongside the outer end of the northern side of the breakwater where there is a depth of 10 feet.

9D-11 The port of Zelenika consists of a rectangular quay built on the eastern shore of Uvala Meljine about 2 miles northeastward of Rt Kabala. It is the terminus of the Dalmatian railroad system. The southwestern approach to the quay has depths of 6 to 10 fathoms. The northwestern side of the quay has a berthing length of 135 yards with 13 to 16½ feet alongside; the southwestern side has a berthing length of 120 yards with 16½ to 19½ feet alongside. The alluvial deposit of the Rujevo Potok, which discharges into the bay immediately southeastward of the quay, is causing the shore bank in that area to extend farther offshore.

A light is shown on the northwestern corner of the quay at Zelenika.

Zelenika, a small town with a population of 250, lies near the shore about 300 yards southeastward of the port. Grain and bauxite are exported. Provisions are procurable and water is piped to the quay. The quay is served by the railroad. The town has telephone and telegraph services; coastal steamers call from other Adriatic ports. A good road leads to Hercegnovi and Kotor.

A pilot station is located at Zelenika. See section 9D-7.

A coaling station is located on the eastern shore about ½ mile southeastward of Zelenika. A small quay, with a depth of 11 feet alongside, lies parallel to the shore. Three mooring buoys, used by lighters, are moored off the quay in a depth of about 8 fathoms. The quay is reserved for naval vessels, but foreign vessels can be supplied in emergencies. Water is piped to the quay.

Anchorage may be taken between Zelenika and the coaling station, in 12 to 14 fathoms,

mud, about 300 yards offshore. During a bora, shore fasts should be used.

KUMBUR

9D-12 Kumbur, a short passage about 800 yards wide in its narrowest part, connects Topaljski Zaliv with Tivatski Zaliv, to the east-southeastward. The depths in midchannel are 12 to 25 fathoms. The southern shore is rather steep-to, but along the northern shore the 10-fathom curve is charted from about 200 to 400 yards offshore.

Regulations.—Vessels passing through Kumbur must reduce speed to 8 knots and pass more than 220 yards southward of Đenovići breakwater, on the northern shore, or more than 330 yards northward of the coast at Pristan, on the southern shore.

An area, about 660 yards wide, extending about 2½ miles eastward of the head of the breakwater at Denovici is prohibited to all vessels when three long blasts are sounded or the International Code flag "U" is shown on the head of the breakwater at Denovici. Vessels proceeding eastward through Kumbur must stop westward of the meridian of the light at the head of the above breakwater.

When the International Code flag "U" is lowered or when two long blasts are sounded traffic may resume.

Prohibited anchorage.—See section 9D-6.

The village of Kumbur lies on the northern shore of the passage in a position about 2 miles east-northeastward of Rt Kabala. A small jetty, with a depth of 13 feet at its head, projects about 80 feet southwestward from the quayed shore of the village.

Spilica, a coaling station, lies directly south-southwestward of the village of Kumbur on the southern shore of the passage. Rt Đenovići, identified by the hangers on it, lies about ½ mile east-southeastward of the village of Kumbur.

The harbor of Đenovići, used as a seaplane basin, lies northward of a breakwater that extends about 250 yards east-southeastward from the shore close eastward of Rt Đenovići.

From off the harbor entrance, where there is a depth of about 9 fathoms, the depths decrease abruptly and, in general, the harbor is a shoal basin. The harbor is quayed. A small jetty, suitable only for small craft, lies at the end of the basin. On the southern side of the head of the breakwater, there is a quay, about 115 feet long, with a least depth of 13 feet alongside. A number of mooring buoys are located in the harbor.

A light is shown on the head of the breakwater at Đenovići. A light is also shown at the head of the knee mole, located about 250 yards northeastward of the head of the breakwater.

The village of Pristan, where there is a small quay with a depth of 13 feet alongside, is situated on the southern shore of the passage southward of Đenovići. A light is shown on the quay.

Mooring buoys.—There are a number of mooring buoys a short distance offshore between the villages of Kumbur and Đenovići and also in the vicinity of Pristan.

Đenovići stands on the northeastern shore of the harbor. Excluding the military, the town has a population of about 450. Provisions are available and water is piped to the quays. The town has telephone and telegraph services. There is a military first aid station in the town.

TIVATSKI ZALIV

9D-13 Tivatski Zaliv (Tivat Bay), the middle bay of Boka Kotorska, is roughly triangular in shape with sides about 4 miles in length. The southern side of this landlocked bay is high, but the northwestern and northeastern sides, which are backed by mountains, are low and well cultivated along the shores. However, Krtolski Zaliv and Uvala Kukuljina, separated from each other by a group of islands and a reef in the southeastern part of the bay, are backed by the lowland of the valley of Župa. The scirocco sweeps through this valley and raises a heavy sea in the bay. On the northeastern shore the naval base of Tivat, which is readily identified by the long buildings of the arsenal and the light structures (sec. 9D-15),

is sheltered from the bora by the high land that rises to a summit, 2,510 feet high, at Mount Vrmač, about $1\frac{3}{4}$ miles east-northeastward. Mt. Devesile, 2,546 feet high, overlooks the northwestern shore about $1\frac{1}{2}$ miles inland. Along the populated northwestern shore there are several quays where small vessels can berth. Excepting Krtolski Zaliv and Uvala Kukuljina the bay is free from any dangers and has depths of from 10 to 24 fathoms. The shores are rather steep-to and the 10-fathom curve is charted about 200 yards offshore; in the vicinity of Tivat the 10-fathom curve lies about 600 yards off the naval base.

Navigational aids.—On the northwestern shore: Two light buoys are moored about 1 mile and $2\frac{1}{4}$ miles, respectively, eastward of the head of the breakwater at Đenovići.

A light is shown on the jetty at Podbaosići, about $1\frac{1}{4}$ miles east-northeastward of Đenovići. Another light is shown on the jetty at Bijela, about 3 miles east-northeastward of Đenovići.

On the southern shore: A light is shown on the jetty at Petrovići about $2\frac{1}{2}$ miles eastward of Pristan.

Lights are shown on the quays at Bjelila and Peć in positions about 3 miles and 4 miles, respectively, eastward of Pristan.

The lights on the northeastern shore at Tivat are described in section 9D-15.

Northwestern side of Tivatski Zaliv.—Crnogorcevic lies about midway between Đenovići and Podbaosići. The village has a small quay with a depth of 16 feet at its head. A high chimney stands behind the quay. At Podbaosići, about $1\frac{1}{4}$ miles east-northeastward of Đenovići, there is an L-shaped jetty with a depth of 12 feet alongside its face. Rt Pijavica, a small point about $2\frac{1}{2}$ miles east-northeastward of Đenovići, has on its southwestern side a small quay with a least depth of 21 feet alongside. Water is piped to the jetty and quay at Podbaosići and Rt Pijavica. The harbor of Bijela, about 3 miles east-northeastward of Đenovići, has an L-shaped jetty with a depth of $11\frac{1}{2}$ feet alongside its face. The town of Bijela, with a population of 1,500, lies close inland.

Anchorage may be taken in 15 to 20 fathoms, mud, about 600 yards off any part of the northwestern shore of the bay, but the area is exposed to the bora and the scirocco.

9D-14 Southern and southeastern sides of Tivatski Zaliv.—Petrovići (Donji Krašići) (Petrović), a landing place recognized by a small jetty and the buildings in its vicinity, and Bjelila, with a small quay suitable only for small craft, lie on the southern shore of the bay in positions about $2\frac{1}{4}$ and 3 miles, respectively, eastward of Pristan.

Krtolski Zaliv (Krtole Bay) and Uvala Kukuljina occupy the southeastern indentation of Tivatski Zaliv between Bjelila and the southern side of Tivat, about 2 miles northeastward. Uvala Kukuljina, the northern and larger bay, is separated from Krtolski Zaliv by three small islands which lie close together on a reef extending about $1\frac{1}{2}$ miles west-northwestward from the head of this indentation. Ostrvo Milosrde (Milosrda) (Otok), the westernmost and smallest island of the group, has a church with a high belfry on it. Ostrvo Sveti Marko (Ostrovo Stradioti) (Ostrvo Maslinik), the middle and largest island, is 118 feet high and has some beacons on its western end. Ostrvo Sveti Trojica (Prevlaka), about 72 feet high, has a chapel on it. Pličina Jezičac (Tonjala Reef), nearly awash and marked on its western extremity by a light, extends about 1,100 yards west-northwestward from the northern end of Ostrvo Sveti Marko. Greben Kaliman, a 3-foot shoal marked by a spar buoy, lies about 180 yards off the northeastern shore in a position about 650 yards south-southeastward of Stanišić Quay (sec. 9D-15), located immediately southeastward of the navy yard at Tivat. General depths in Krtolski Zaliv and Uvala Kukuljina are 7 to 13 fathoms. The 5-fathom curve is charted about 100 yards off the southern shore and, excepting Pličina Jezičac, the same distance off the

northern and southern sides of Ostrvo Sveti Marko. On the northeastern shore the 5-fathom curve lies about 300 yards offshore and rounds the head of either bay at a distance of about 600 yards offshore.

Anchorage.—Moderate-sized vessels may anchor in Krtolski Zaliv in 8 to 10 fathoms, mud, good holding ground, between Ostrvo Sveti Marko and the mainland. This anchorage is sheltered from the bora, scirocco, and northwesterly winds.

In Uvala Kukuljina large vessels may take anchorage in 8 to 10 fathoms, mud, good holding ground, about midway between the summit of Ostrvo Sveti Marko and the mainland northeastward.

Prohibited anchorage.—See section 9D-6.

Submarine operating area — Torpedo range.—Tivatski Zaliv is the center of much naval activity. There is a torpedo range, about $3\frac{1}{4}$ miles long, in the southern part of the bay between Pristan and Ramadanovic, about $\frac{1}{2}$ mile south-southeastward of Stanišić Quay. The range is indicated by pairs of white pillars at Pristan, Ramadanovic and at seven intervals on the shore, the easternmost being near the western end of Ostrvo Sveti Marko.

TIVAT

Position: 42°26' N., 18°42' E.

Depths:

Close off basin, 5 fathoms.

Basin entrance, 19 feet.

Basin, 10 to 26 feet.

Stanišić Quay, 13 feet.

Anchorage, 13 to 14 fathoms.

Tidal rise: MHWS, 1 foot; MHWN, $\frac{1}{2}$ foot.

Port plan: See section 9D-16.

9D-15 The harbor of the naval base of Tivat lies in the northeastern part of Tivatski Zaliv about 9 miles within the entrance of Boka Kotorska.

Harbor.—The naval base of Tivat lies between the northern entrance of Uvala Kukuljina and Rt Seljanovo (Zeljanovo), a small narrow projection about $\frac{3}{4}$ mile northwestward, and can be identified by the

numerous buildings in its vicinity. The harbor lies along the quayed shorefront of the arsenal and consists of a rectangular basin with its entrance, about 100 yards wide, in its southwestern corner, a pier extending about 250 yards westward from a position about 200 yards southward of the basin and midway between the basin and pier, a small boat basin. Two floating drydocks are moored outside the harbor to the western side of the basin. Stanišić Quay is located about 250 yards southeastward of the root of the pier.

The 5-fathom curve is charted close westward of the head of the pier and about 100 yards westward of the basin. In the basin entrance there is a depth of 19 feet. The basin is shoal for the most part with depths of 10 to 26 feet, the greatest depth being in the western part.

Navigational aids.—A light is shown on Rt Seljanovo; a beacon stands close eastward of the light structure.

A light is shown on the head of the pier southward of the basin. Another light is shown on the northwestern corner of Stanišić Quay. A light is shown at Kaliman, about $\frac{1}{4}$ mile southeastward of Stanišić Quay.

Mooring buoys.—Several mooring buoys are located offshore in the vicinity of Tivat.

Anchorage.—Anchorage may be taken off the harbor of Tivat in 9 to 15 fathoms. See section 9D-6 for anchorage restrictions.

9D-16 Tivat lies about $\frac{1}{2}$ mile eastward of the navy yard. The harbormaster's office is in the town and the health office is on Stanišić Quay.

The basin at the navy yard is quayed and has depths of 3 to 24 feet alongside. The pier has a depth of 22 feet alongside its head, 24 feet alongside the outer end of its southern side, and 18 feet alongside the outer end of its northern side. Stanišić Quay is about 200 feet long and has 13 feet alongside. Commercial vessels normally use Stanišić Quay. Four tugs, several lighters, nine cranes with capacities up to 50 tons, four floating cranes with capacities up to 45 tons are available. There is a stationary crane on the pier and one on the mole forming the southern side of the basin. Railroad spurs, connected only with the navy yard facilities, serve the quays and the pier.

Provisions are available. Water is piped to the quays and the pier. Small quantities of fuel oil is available.

The navy yard has extensive facilities for all kinds of ship repairs. A floating drydock with a total length of 411 feet, has a lifting capacity of 7,000 tons. There is another floating drydock of similar dimensions and capacity.

Tivat has telephone and telegraph services. Coastal steamers call from other Adriatic ports. A road leads to Kotor.

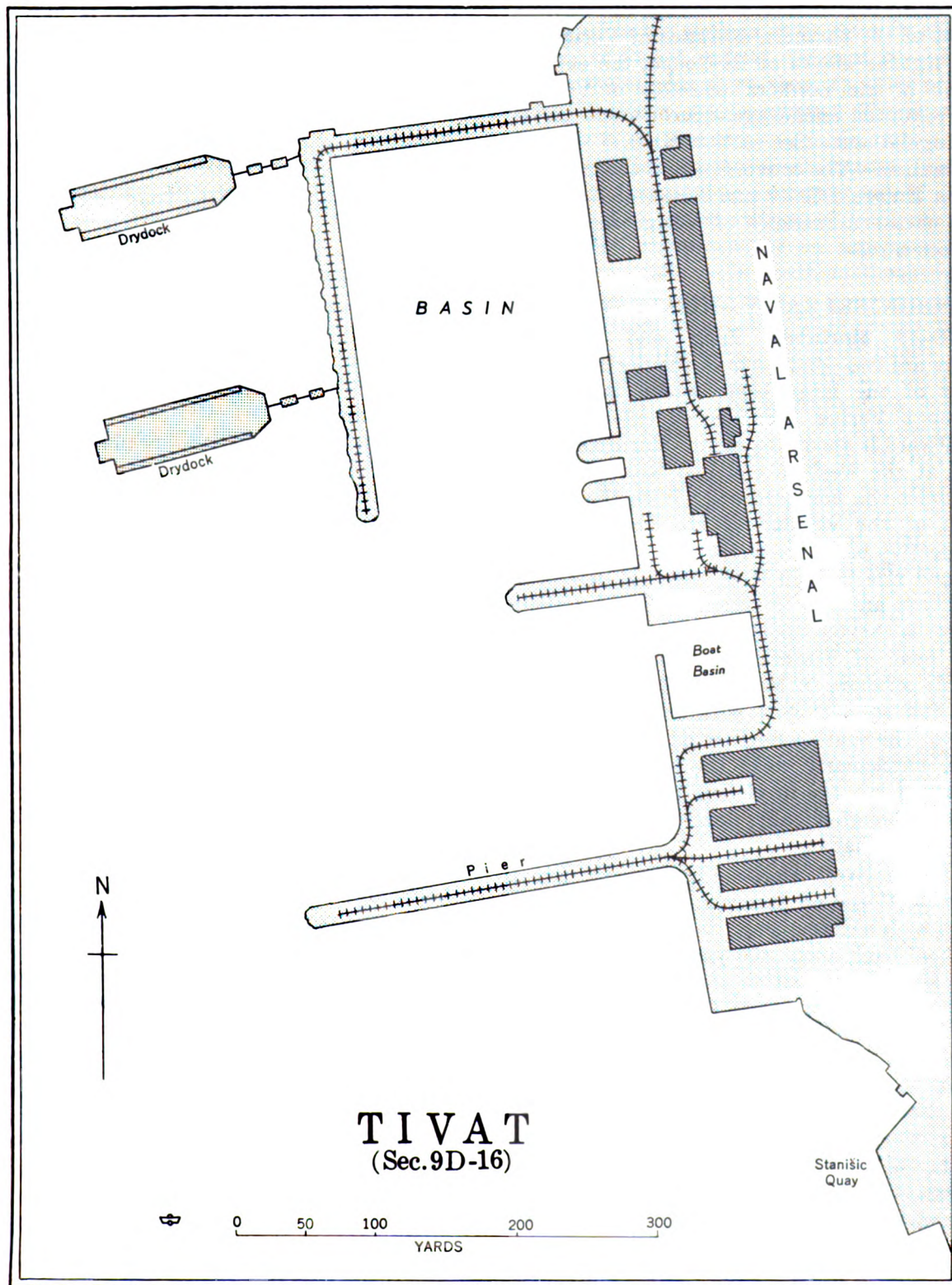
9D-17 Donja Lastva is a town about $\frac{1}{4}$ mile north-northeastward of Rt Seljanovo. The town has a church, which is conspicuous from all parts of the bay. The population is about 900. There is a small quay with a depth of 11 feet alongside. Anchorage is available about 800 yards west-southwestward of the quay in 13 to 20 fathoms, mud, good holding ground. A light is shown on the quay.

VERIGE

9D-18 Verige, a narrow steep-to passage about $1\frac{1}{4}$ miles long, connects the northern end of Tivatski Zaliv with the large basin that comprises Morinjski Zaliv and Risanski Zaliv, to the northwestward, and Kotorski Zaliv, to the southeastward. The channel is entered between Rt Sveta Nedelja, about $3\frac{1}{2}$ miles east-northeastward of Đenovići (sec. 9D-12), and Rt Opatovo, about 400 yards eastward. It leads north-northeastward in depths of 19 to 22 fathoms with no dangers outside 50 yards of either shore. At its northern entrance between Turski Rt and Rt Gospa, where it enters the large basin, it narrows to about 300 yards.

Navigational aids.—A light is shown on Rt Sveta Nedelja. Another light is shown on Rt Opatovo.

A light is shown on a quay at the village of Kameari, on the western shore about 800 yards northward of Rt Sveta Nedelja. A light is shown on a quay at Lepetane, on the eastern shore.



A light is shown on Turski Rt, the western point of the northern entrance of Verige.

A light is shown on Rt Gospa, the eastern point of the northern entrance of Verige.

Prohibited anchorage.—See section 9D-6.

Regulations.—See section 9D-6.

Caution.—The convergence of the currents from Kotorski Zaliv and Risanski Zaliv off the northern entrance of Verige sometimes causes a race.

MORINJSKI ZALIV—RISANSKI ZALIV

9D-19 Morinjski Zaliv and Risanski Zaliv are two small bays in the northwestern part of the large basin which is entered through Verige. The overall extent northward is about $1\frac{1}{2}$ miles. Morinjski Zaliv lies at the western end and Risanski Zaliv occupies the northern end. With the exception of the vicinity of the heads of the respective bays, the shores are rather steep-to and rise to high land. General depths in the bays are 8 to 19 fathoms. The 6-fathom curve is charted about 300 yards offshore at the head of Risanski Zaliv and about 200 yards offshore in Morinjski Zaliv.

Land squalls blow with strength in the bays. The southeasterly wind is also dangerous, particularly near the northern shore which it reaches in violent gusts. Northerly winds, though squally, never become dangerous in the bays.

Otočići Sveti Đorđe (Juraj) and Sveta Marija, Gospe od Škrpjela, two small islets, each with a chapel on it, lie close together on a shoal bank about 400 yards off the northern shore in a position about $\frac{1}{2}$ mile north-northeastward of Turski Rt. The shoal bank, with depths of less than 5 fathoms, extends about 80 yards northwestward from Otočić Sveti Đorđe, the northwestern islet, and about 60 yards southeastward from the other islet. There is a passage on either side of the islets, the southwestern side being the wider.

Perast, a triangular-formed village, lies on the northern shore directly north-northeast-

ward of the entrance of Verige. It has a population of 460. Two small quays front the village; the larger quay is 165 feet long and has a depth of $13\frac{1}{2}$ feet alongside. Perast has telephone and telegraph services.

A light is shown on the larger quay at Perast.

A light is shown from the head of the pier at the small village of Dabovici, located about 1 mile northwestward of Turski Rt.

Morinj, a village with a population of 450, lies on the northern side of the mouth of a stream that flows eastward through a valley into the head of Morinjski Zaliv. There are several jetties, suitable only for small craft, in the harbor.

A light is shown on a landing place on the northeastern shore at Morinj.

Lipci, a small village recognized by the green fuel tanks near the shore, lies about $\frac{1}{2}$ mile northeastward of Morinj. The village has a quay, about 170 feet long with a depth of $8\frac{1}{2}$ feet alongside, and a small wooden jetty. Pipe lines run from the fuel tanks to the quay. Several mooring buoys are located off the village.

The harbor of Risan lies at the head of Risanski Zaliv. It is formed by a quayed curvilinear breakwater within which there is a basin open to the northward. The 5-fathom curve lies about 50 yards westward of the head of the breakwater and within the basin there are depths of 9 to 13 feet.

Anchorage may be taken off the harbor of Risan in 7 to 11 fathoms, mud, good holding ground.

Prohibited anchorage.—See section 9D-6.

A light is shown on the head of the breakwater at Risan.

Risan, a town with a population of about 1,400, fronts the harbor. The breakwater is about 265 feet long and has 12 feet alongside its eastern face and 17 to 18 feet alongside its western face. The inner south-

ern elbow is 110 feet long with 12 feet alongside.

Small craft berth in the basin formed by the breakwater; coasting vessels use the eastern face and sea-going vessels berth alongside the western side of the breakwater. Provisions are obtainable. The town has telephone and telegraph services. A good road leads to Kotor and Hercegnovi. A hospital is located in the town.

KOTORSKI ZALIV

9D-20 Kotorški Zaliv, the innermost bay of Boka Kotorska, comprises the eastern part of the basin entered through the northern end of Verige. The bay extends eastward about $3\frac{1}{4}$ miles and thence tapers southward in a narrow bight for an additional $2\frac{1}{2}$ miles. It is surrounded by high mountains on all sides. Along the northern and eastern shores there is a narrow strip of flat cultivated land that is backed, in places, by wall-sided mountains. The southwestern side of the bay consists of the northern and eastern slopes of Mount Vрмаč (sec. 9D-13). The southwestern and eastern shores of the bay are well-populated and Kotor, the principal harbor in Boka Kotorska, lies on the eastern shore of the head of the narrow bight.

In general, the bay is free from dangers. There are depths of 7 to 21 fathoms, the shores are steep-to, and at no place in the bay does the 5-fathom curve lie more than 150 yards offshore.

The bora and scirocco blow with considerable force in Kotorški Zaliv, particularly along the northern shore. There is normally a northerly current along the eastern shore, but with a persistent scirocco it sets southward.

Submarine cable.—A cable is laid across Kotorški Zaliv from the eastern part of Perast to Andrići, a town located on the southwestern shore about $\frac{1}{2}$ mile eastward of Rt Gospa. White pyramidal towers mark the landing places of this cable.

Landmarks.—The houses at Dražin (Dražin) Rt, located on the northern shore about $1\frac{1}{4}$ miles eastward of Perast, and the church at Sveti Stašija, on the eastern shore about $3\frac{1}{4}$ miles eastward of Rt Gospa, are conspicuous. The village of Stoliv is divided into two parts. The lower village lies on the southwestern shore about 1 mile east-southeastward of Rt Gospa. The upper village and its church stands out conspicuously on the mountain slope about 600 yards south-southeastward of the lower village.

Navigational aids.—A light is shown on a small mole at the lower village of Stoliv.

A light is shown at Sveti Stašija. Another light is shown on the southwestern shore about 1 mile southwestward of Sveti Stašija.

Prčanj, a small harbor lying on the southwestern shore about $3\frac{1}{4}$ miles east-southeastward of Rt Gospa, is the western point of entrance of the narrow bight that terminates at Kotor. The harbor is formed by a small boat basin, the outer part of which has a berthing length of about 150 feet with a least depth of $12\frac{1}{2}$ feet alongside. The town of Prčanj, fronting the harbor, has a population of 770. It has telephone and telegraph services.

A light is shown on Rt Rdakovo (Zbutego Point) near the southern end of Prčanj. A light is also shown at the quay at Prčanj.

Dobrota lies on the eastern shore about $\frac{1}{2}$ mile south-southeastward of Prčanj. Sveti Matija Church stands conspicuously in the town. Dobrota is fronted by a quay about 210 feet long with a least depth of $9\frac{3}{4}$ feet alongside. A light is shown on the quay.

Sveti Ilija Church stands conspicuously on the extremity of Rt Sveti Ilija, a small projection about 800 yards southward of Dobrota.

Muo, a village located on the western shore about 600 yards west-southwestward of Rt Sveti Ilija, is fronted by a quay suitable only for small craft. A light is shown on the head

of a mole about $\frac{1}{4}$ mile northward of the village. A mooring buoy is located about 200 yards eastward of the quay.

Anchorage may be taken, in 16 fathoms, about 1 mile northwestward of Sveti Stasija. Anchorage may be taken west-northwestward of Kotor or southwestward of Dobrota, in 9 fathoms.

KOTOR

Position: 42°25' N., 18°46' E.

Depths:

Bay approach, 8 to 11 fathoms.

Anchorage, 9 fathoms.

Quay, 13 to 19 feet.

Tidal rise: MHWS, 1 foot; MHWN, $\frac{1}{2}$ foot.

Port plan: See section 9D-22.

9D-21 The harbor of Kotor lies on the eastern side of the head of Kotorski Zaliv about 15 miles from the entrance of Boka Kotorska.

Harbor.—The harbor consists of a quayed waterfront, about 600 yards long, on the southwestern side of the town. The northwestern part of this quay forms the southern side of the entrance of a narrow inlet that bounds the northern side of the town. The Skurda River discharges into the bay about 200 yards northward. Depths in the harbor approach are 8 to 11 fathoms. The 5-fathom curve lies close westward of the northwestern corner of the quay and about 150 yards northward of the head of the bay. A mooring buoy is located about 150 yards southwestward of the quay. The remaining ten mooring buoys in Kotor harbor are reserved for Yugoslav naval vessels.

Anchorage may be taken in 9 fathoms, mud, good holding ground, off the mouth of the Skurda River in a position about 300 yards northwestward of the quay.

A light is shown on the northwestern corner of the quay at Kotor.

Note.—The water of the harbor is fresh.

9D-22 Kotor, the principal town of Boka Kotorska, is surrounded by a high wall and backed by the steep slope of a high hill. The population is about 2,100. The quay fronting the town has a berthing length of about 600 yards with 13 to 19 feet alongside the northern half of this quay. The remainder of the quay has lesser depths and is used by small craft. The southern side of the outer part of the inlet is quayed and is suitable only for small craft. Larger vessels either anchor or moor off the quay. Several lighters are available.

Provisions are plentiful. Water is available in limited quantities; it can be delivered by water boat or taken from hydrants on the quays. Small quantities of coal and fuel oil can be obtained. The town has telephone and telegraph services. Coastal steamers call from other Adriatic ports. A good road leads to Hercegnovi, Cetinje and Budva. There is a military hospital that will accept seamen. The sanitary conditions of the port are excellent.

ANCHORAGES

9D-23 General anchorages in Boka Kotorska.—See section 9D-6.

Luka Zanjica.—See section 9D-8.

Uvala Meljine.—See section 9D-10.

Off Zelenika.—See section 9D-11.

Northwestern side of Tivatski Zaliv.—See section 9D-13.

Krtloski Zaliv.—See section 9D-14.

Uvala Kukuljina.—See section 9D-14.

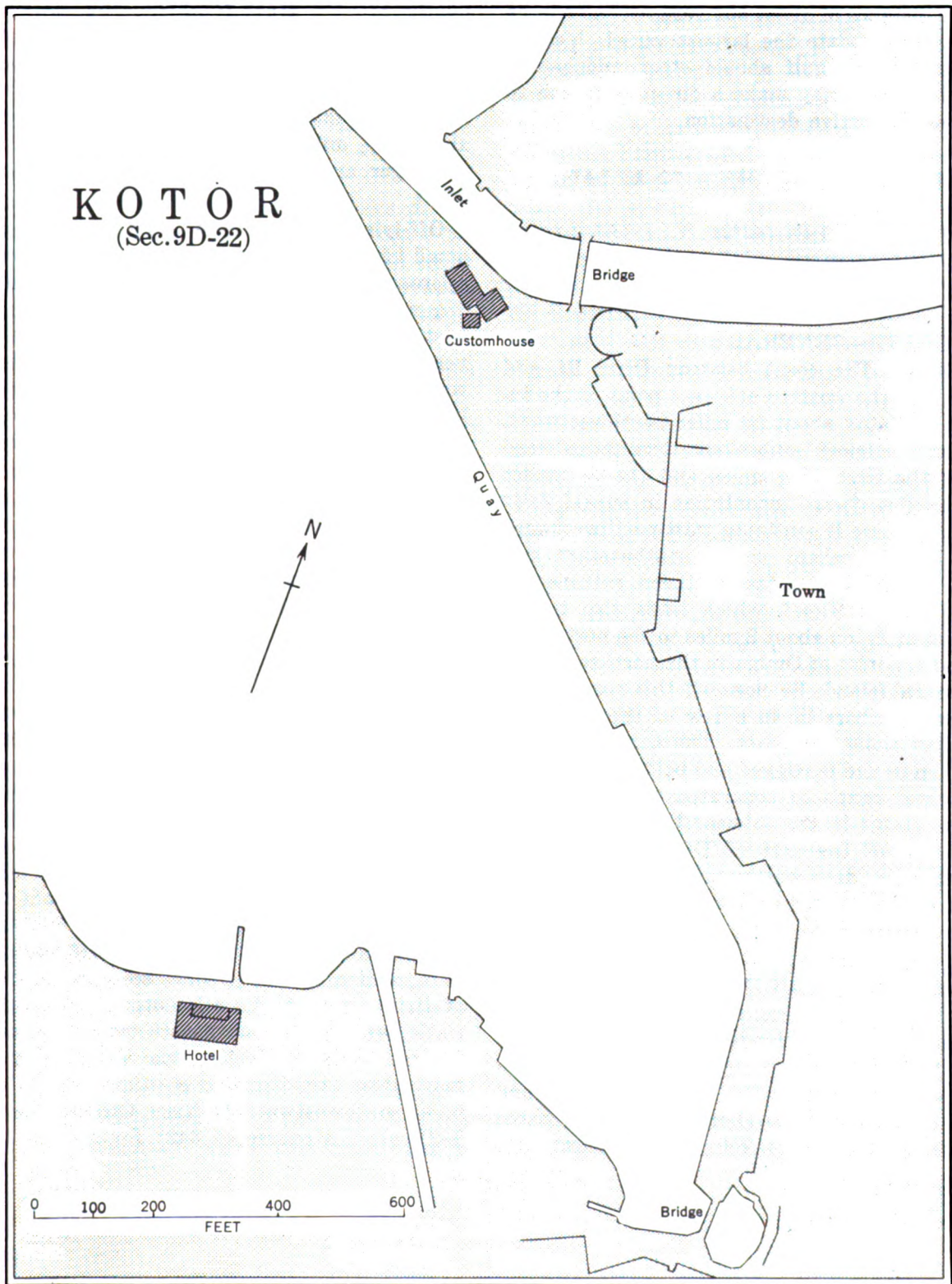
Harbor of Tivat.—See section 9D-15.

Risanski Zaliv.—See section 9D-19.

Kotorski Zaliv.—See sections 9D-20 and 9D-21.

GENERAL DIRECTIONS FOR BOKA KOTORSKA

9D-24 The approaches, the entrance, and the connecting narrow passages of Boka Kotorska are all rather steep-to and relatively free from dangers. The harbors in the gulf are readily identified by their clustered settlements which, in most cases, are dominated by conspicuous churches. With the exception of the $6\frac{1}{2}$ -fathom rocky patch in the entrance of the gulf and the shoal waters of the western part of Topaljski Zaliv and the two bays in the southeastern part of Tivatski Zaliv, there are sufficient depths



at a distance of about 500 yards off all shores to accommodate the largest vessel. Vessels entering the gulf should steer midchannel courses and may make a direct approach to their respective destination.

PART E. BOKA KOTORSKA TO RT BAT

9E-1 Oštri Rt ($42^{\circ}24' N.$, $18^{\circ}32' E.$), the western entrance point of Boka Kotorska, is described in section 9D-8.

COAST—GENERAL

9E-2 The coast between Oštri Rt and Rt Bat, the western entrance point of the inlet of Zaton about 28 miles northwestward, trends almost unbrokenly northwestward for the first $18\frac{1}{2}$ miles and thence makes a northeastward indentation in župski Zaliv from where it continues west-northwestward to Hridi Grebeni on the southeastern side of Velika Vrata, the southern entrance of Koločepski Kanal, which leads also to the inlet of Zaton about 2 miles to the northward and the inlet of Ombla to the northeastward. Several islands lie close off this coast. Sheltered harbors lie in a few of the bays and inlets along the coast. The coast is mostly steep-to and is rugged and bold. A bordering coastal range is separated from the high mountains in the interior by a valley. The harbor of the port of Dubrovnik together with its deep-water harbor, Luka Gruž, forms the center of commercial shipping on this coast.

DEPTHS—DANGERS

9E-3 In general, the shores of the mainland and the islands are rather steep-to outside the closely fringing ledges, which are described with the related features, and at no place off these shores does the 5-fathom curve lie more than 200 yards offshore. The

depths are too great for anchoring, except in the bays and roadsteads in the vicinity of the harbors. The only known danger on this coast is a rock, with $11\frac{1}{2}$ fathoms over it, lying about 200 yards offshore in a position about $14\frac{1}{4}$ miles northwestward of Oštri Rt.

Danger area—Firing range.—See section 9D-4.

Off-lying islet.—Otočić Sveti Andrija, a small islet 170 feet high, lies in the western approach to Velika Vrata in a position about $4\frac{1}{4}$ miles westward of Hridi Grebeni. The islet is covered with vegetation, has a convent on it, and is precipitous on its southwestern side. A detached 9-fathom patch lies about 400 yards east-southeastward of the southern extremity of the islet. A light is shown on the summit of the islet.

NAVIGATION

9E-4 The coastal track between Rt Mendra and Boka Kotorska (sec. 9C-5) leads to a position about $3\frac{3}{4}$ miles southwestward of Oštri Rt. A continuation of this track on a course of 311° for an additional 27 miles leads to a position about $1\frac{1}{4}$ miles southwestward of Hridi Grebeni. This course passes over great depths and gives the coast a berth of about 3 miles and the off-lying islets a berth of 2 miles.

Vessels entering the Adriatic Sea from the westward and bound for Luka Gruž or the inlets of Ombla and Zaton via Velika Vrata may, after arriving at a position about 2 miles eastward of Capo di Otranto (sec. 3A-5), steer a course of 351° for about 154 miles to a position about $1\frac{1}{4}$ miles southwestward of Hridi Grebeni. Vessels entering the Adriatic Sea from the southeastward and bound for the same destination via Velika Vrata may, after arriving at a position about $6\frac{3}{4}$ miles southwestward of Nisos Othonoi (sec. 8-2), steer a course of 342° for about 179

miles to the position about $1\frac{1}{4}$ miles southwestward of Hridi Grebeni. Both of these tracks lead over great depths and are entirely free from dangers.

Navigation within Velika Vrata is given with the directions for each port.

CURRENTS—WEATHER

9E-5 The general characteristics of the currents and the weather off the coast between Rt Mendra and Boka Kotorska apply to this section of the coast. The northwesterly current that sets along the coast of Yugoslavia (sec. 9C-6) deflects to the westward and west-northwestward as it reaches the off-lying islands northwestward of Velika Vrata. Between Hridi Grebeni and Ostrvo Koločep the current sets in a general west-southwesterly direction at a velocity of about $\frac{3}{4}$ knot. In the inlet of Ombla the current always sets seaward at an average velocity of 1 knot and in the vicinity of Rt Loznica (sec. 9E-16) a strong southwesterly set has been reported. The strength and direction of the wind are influential factors in the set and velocity of the currents.

Velika Vrata and the adjoining inlets are subject to winds that are characteristic of the entire coast of Yugoslavia. Strong northwesterly and southwesterly winds send heavy seas into Velika Vrata and the entrance of Ombla, but they are usually of short duration. The port of Gruž is sheltered from all winds except the bora, which blows with exceptional violence in this vicinity, particularly off Rt Kantafig (sec. 9E-16). In the port the direction of the bora is variable but it never raises a sea. During southeasterly winds there are heavy squalls over Zaliv Lapad (sec. 9E-11) and out of Ombla.

COASTAL FEATURES—LANDMARKS

9E-6 Sniježnica, 4,048 feet high and the highest mountain along this coast, has a

bare summit that towers remarkably above the adjacent lower mountains about 4 miles inland in a position about $13\frac{1}{2}$ miles north-westward of Oštri Rt. It makes an excellent landmark from any position along the coast.

About 6 miles northwestward of Oštri Rt there is a hammerhead-like peninsula, about $1\frac{1}{4}$ miles long, which, projecting northwestward and southeastward, forms two small bights between it and the mainland. Ostrvo Molunat, a small island 160 feet high, lies close southeastward of the peninsula. Otočić Supetrić, a small islet 19 feet high, lies close northeastward of the island.

Luka Mali Molunat, the southeastern bight, is protected by Ostrvo Molunat, on which a light is shown, and Otočić Supetrić. Foul ground, with depths of 5.5m (3 fm) and less, surrounds the islet and extends about 100 yards from the eastern side of the island and the western and northern sides of the bight. The narrow entrance, lying between the mainland and the foul ground extending about 100 yards northeastward from the islet, is very narrow and has a fairway depth of 10.9m (6 fm). Inside the bight, where there are depths of 6.2m (3 $\frac{1}{4}$ fm) to 12.8m (7 fm), small vessels are afforded shelter from the bora and northwesterly winds. Southeasterly winds send in a heavy sea, but if properly moored there is no danger. The best anchorage is about 300 yards northwestward of Otočić Supetrić in a depth of 7.3m (4 fm), sand and shells, good holding ground. During a bora it is preferable to use shore fasts to the northeastern shore. There is a village and a small quay, with a depth of 2.1m (7 ft.) alongside in the bight.

A light is shown on the northeastern shore of the entrance of Luka Mali Molunat.

Luka Veliki Molunat, the northwestern bight, is exposed to northwesterly winds which send in a heavy sea. The bay is steep-to and has depths of 12.8m (7 fm) to 24m (13 fm). Temporary anchorage may be taken in a depth of 20.1m (11 fm), mud, good holding

ground, in the middle of the bay. Shore fasts are used during a bora.

Ilijino (Ilino) Brdo, a mountain with a chapel on its 1,840-foot summit, slopes to the shore in a position about 9 miles northwestward of Oštri Rt.

An aviation light is located about 12 1/2 miles northwestward from Ostri Rt.

Rt Sustjepan, serving as the southern point of entrance of Župski Zaliv and also that of Cavtatska Luka (described below), is the northwestern extremity of a narrow projection, 154 feet high, about 18 1/2 miles northwestward of Oštri Rt. This projection forms the southwestern side of Cavtatska Luka and between it and Otočić Mrkan, about 2 3/8 mile southwestward, there is a deep passage. A chapel stands on the point. An above-water rock lies near the coast about 1/4 mile south-southeastward of Rt Sustjepan.

Off-lying islets.—**Otočići Cavtatski Grebeni**, about 18 1/2 miles northwestward of Oštri Rt and about 2 3/8 mile southwestward of Rt Sustjepan, consist of two steep and rocky islets and some above-water rocks.

Otočić Mrkan, the southern and larger islet, is 213 feet high and steep-to except for some above- and below-water rocks extending about 400 yards southeastward from its southeastern extremity. There are some ruins on the summit of this islet. **Otočić Bobara**, the northwestern islet, is 147 feet high and also steep-to. A chain of above-water rocks extends about 700 yards southeastward from its southeastern side, leaving a clear and deep passage, about 450 yards wide, between the outer rock and Otočić Mrkan.

9E-7 Župski Zaliv (Tiha Bay), somewhat sheltered from the southwestward by Otočići Cavtatski Grebeni, is the northeastern coastal indentation between Rt Sustjepan and Rt Pelegrino, about 2 1/4 miles northwestward. The eastern and southeastern shores of the bay are backed by the slopes

of a coastal mountain range, but on the northern side there is a valley through which a river discharges into the bay. **Stražišće**, a mountain 2,300 feet high located about 2 miles east-northeastward of Rt Sustjepan, makes a good landmark. The bay is sheltered from the bora and southeasterly winds, but northwesterly and southwesterly winds send in heavy seas. Excepting the few dangers in the vicinity of Cavtatska Luka and the shoal water at the head of Zaliv Tiha, both located on the southern side of the bay, the shores are fairly steep-to and there are depths of 14.6m (8 fm) to 40m (22fm) in the bay.

Anchorage may be taken in Župski Zaliv in 28m (15 fm) to 37m (20 fm), mud, good holding ground, about 1/2 mile off the eastern shore.

Large vessels entering župski Zaliv from the southward are advised to pass to the northward of Otočić Bobara and Otočić Supetar (described below).

A light is shown on the northern side of the entrance of Cavtatska Luka in a position about 400 yards northeastward of Rt Sustjepan. Lights are shown from the heads of two breakwaters on the northern shore of the bay.

Cavtatska Luka, a small harbor capable of accommodating only a few small vessels, lies open to the northwestward between two short and narrow peninsulas. Rt Sustjepan, the southern entrance point, is the extremity of the southwestern peninsula and Rt Sveti Rok, about 650 yards north-northeastward, is the northwestern extremity of the peninsula forming the northeastern side of the harbor. The greater part of the northeastern peninsula is occupied by the town of Cavtat; a mausoleum stands on its 135-foot summit. The dangers in the approach and the entrance of Cavtatska Luka are described below. Otherwise there are depths of 12.8m (7 fm) to 20.1m (11 fm) in the bight and the 6-fathom curve is charted less than 100 yards off either side and about 150 yards off the head of the harbor.

Otočić Supetar, a small islet 26 feet high, lies about $\frac{1}{2}$ mile northwestward of Rt Sveti Rok.

Hrid Šuperka, an above-water rock, lies on a rocky patch, about 300 yards in extent and with depths of 6 fathoms and less, in a position about 400 yards southeastward of Otočić Supetar.

A sunken rock, with a depth of $1\frac{1}{4}$ fathoms and depths of about 4 fathoms around it, lies in the entrance of Cavtatska Luka about 450 yards northwestward of Rt Sus-tjepan. A light is shown on this rock. Another sunken rock, steep-to on its western side and with a depth of 1 fathom, lies about 200 yards southwestward of Rt Sveti Rok.

Anchorage may be taken by small vessels in Cavtatska Luka in 7 to 11 fathoms, mud, weed, and sand, good holding ground, in the middle of the harbor. Shore fasts are used.

Pilotage is compulsory. The nearest pilot station is off Gruž (sec. 9E-19). For details and pertinent regulations, see section 9E-17.

Cavtat, a town with a population of 770, is the center of the local wine industry. The town is fronted by a quay about 900 feet long. The outer 230 feet has a depth of $16\frac{1}{2}$ feet alongside; the remainder is shallow and suitable only for small craft. The town has telephone and telegraph services. A station on the Dalmatian railroad is located about $1\frac{3}{4}$ miles southeastward of the town. Coastal vessels call from other Adriatic ports. A good road leads to Zelenika and Gruž.

9E-8 Zaliv Tiha (Port Tiha), a small bay with depths of 5 to 9 fathoms, lies between Rt Sveti Rok and Rt Prahlijivac (Prah-glivaz), about $\frac{2}{3}$ mile east-northeastward. It is reported that the bay, though exposed to northerly winds which raise no sea here,

affords good shelter to small vessels in any wind. A shoal bank, with depths of 3 fathoms and less, borders the eastern and southern shores and the indentation at the head of the bay is completely shoal.

Anchorage may be taken in Zaliv Tiha in 8 to 11 fathoms, mud and sand, about 700 yards eastward or east-northeastward of Rt Sveti Rok. In lesser depths the holding ground is poor. Small craft moor with shore fasts in the southern part of the bight.

Kupari is a village on the northern shore of Župski Zaliv about 1 mile east-northeastward of Rt Pelegrino. It has a small mole with a depth of 12 feet alongside. About $\frac{1}{2}$ mile farther eastward is the village of Mlini.

The coast between Rt Pelegrino and Dubrovnik, about $3\frac{1}{2}$ miles west-northwestward, is barren, rocky, and steep-to.

Ostrvo Lokrum, a rocky and steep-to islet nearly 1 mile long, lies on the southern side of the roadstead at Dubrovnik in a position about 3 miles northwestward of Otočić Bobara (sec. 9E-6). The islet has two summits, the northern 298 feet high and the southern 180 feet high, and when seen from the southwestward it appears as two islets. The islet is covered with evergreen trees and bushes. Ruins of a fort stand on the northern summit.

A submarine cable is laid from the northeast extremity of Ostrvo Lokrum in a northwesterly direction to the mainland.

Dubrovnik Roadstead is a danger-free roadstead, with depths of 6 to 25 fathoms, located between the northern end of Ostrvo Lokrum and the mainland about 800 yards northward. It is exposed to southeasterly and southwesterly winds, which send in heavy seas, and there is no shelter from southerly winds. Vessels seeking shelter from southeasterly winds may haul close

under the northern shore of the island and use shore fasts, but this anchorage is considered safe only during the summer. The bottom of the roadstead consists of sand, shell, and weeds; the holding ground is poor.

DUBROVNIK

Position: 42°38' N., 18°07' E.

Depths:

Roadstead approach, 6 to 25 fathoms.

Harbor entrance, 16 feet.

Northern pier, 10½ to 12 feet.

Tidal range: Mean, 0.7 foot; Spring, 1 foot.

Port plan: See section 9E-10.

9E-9 The harbor of Dubrovnik lies in the northwestern part of Dubrovnik Roadstead about 24 miles northwestward of Oštri Rt.

Navigation.—Vessels bound for the port of Dubrovnik from the southeastward may continue on the coastal track (sec. 9E-4) on a course of 311° until Fort Srdj (described below) bears 360° and thence steer on that bearing to the approach to the harbor. At night, however, vessels should not alter course from the coastal track until the light on the entrance breakwater of the harbor bears 015° and thence approach on that bearing. Vessels approaching the harbor from the westward from a position southwestward of Hridi Grebeni (sec. 9E-11) will encounter no dangers and will pass over deep water by giving the salient points of the coast a berth of at least ¼ mile.

Depths.—In the approaches and off the harbor entrance there is deep water. The 6-fathom curve lies about 20 yards eastward of the short breakwater, which is foul on its northern side. The controlling depth in the harbor entrance is 16 feet, but within the harbor the depths decrease rapidly toward the shores.

Landmarks.—The dark peaks of Mount Petka, near the coast about 2 miles westward of Dubrovnik, and the dark forested Ostrvo Lokrum are useful landmarks in approaching the roadstead and the port of Dubrovnik. Fort Srdj, located on a 1,350-

foot hill above the city, and the buildings of the compacted city serve to identify the port. A conspicuous tower, painted orange, stands about ¾ mile northward of Dubrovnik.

Harbor.—The small harbor of Dubrovnik is protected somewhat from the southward and the southeastward by a walled headland from which a short breakwater extends eastward. A detached breakwater, about 90 yards long, fronts the harbor and affords some shelter from the eastward. The entrance of the harbor, about 125 feet wide, lies between the short and the detached breakwaters. The passage between the mainland and the northern end of the detached breakwater is foul with rocks. The inner side of the detached breakwater and the southern and western sides of the harbor are quayed. Two small piers extend from the western side of the harbor.

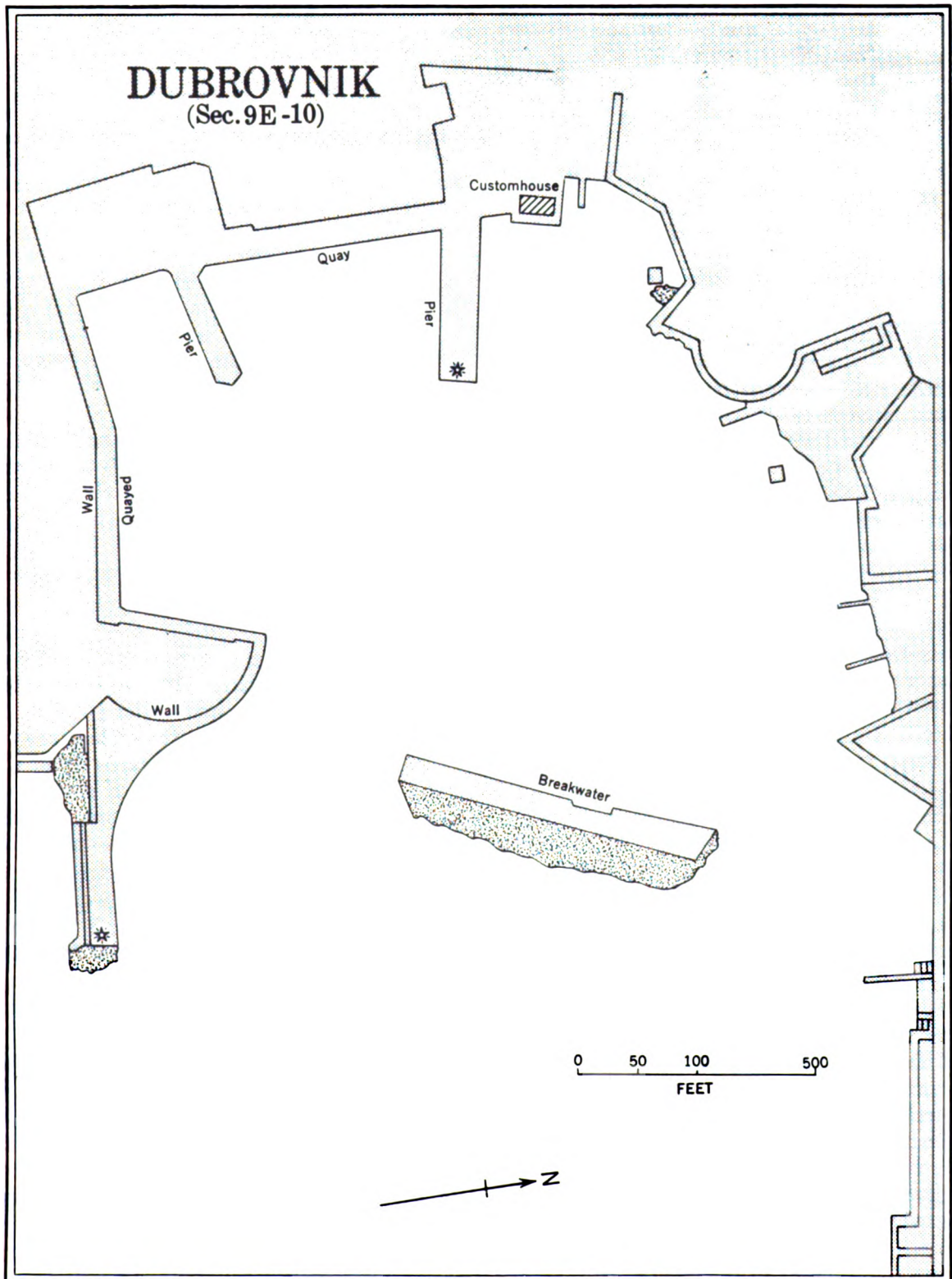
Navigational aids.—A light is shown on the head of the short breakwater. Another light is shown on the head of the northern pier.

Pilotage is compulsory. The nearest pilot station is off Gruž (sec. 9E-19). For details and pertinent regulations, see section 9E-17.

Caution.—Southeasterly winds cause a heavy sea making it difficult, if not impracticable, to enter the harbor during such times.

9E-10 Dubrovnik is located on the western side of the harbor. The city occupies a picturesque position at the foot and lower slopes of the hill on which Fort Srdj stands. The old city is surrounded by a high wall and is extremely compact. The modern suburbs, with numerous hotels and public buildings, extend to its neighboring port of Gruž, about 1¼ miles northwestward. Dubrovnik is the main tourist center of the Dalmatian coast. The port has insufficient facilities, hence Gruž is the seaport of Dubrovnik. Together they are the commercial center of the southwestern part of Yugoslavia. Timber, minerals, and foodstuffs are the principal exports. The population of Dubrovnik was about 20,000 in 1964. The customhouse is located near the root of the northern pier.

Small vessels berth at the northern pier, which is about 125 feet long and has a depth of 12 feet alongside its southern side and 10½ feet alongside its northern side. The remaining berths in the harbor are shallow and are used by fishing vessels and small craft.



Provisions are procurable in limited quantities. Water is piped to the northern pier. A small stock of coal is available. A tramway connects Dubrovnik with Gruž. The city has telephone and telegraph services. Coastal steamers call from other Adriatic ports. There is a hospital for infectious diseases and also a military hospital. The sanitary conditions of the port are good.

COASTAL FEATURES—LANDMARKS (Continued)

9E-11 The coast between the port of Dubrovnik and Rt Petka, about $2\frac{1}{2}$ miles west-northwestward, forms the southern side of Lapad Peninsula. It is rather bold, steep-to, and covered with brushwood. Mount Petka, about $\frac{1}{2}$ mile eastward of Rt Petka, consists of two peaks; the eastern and higher peak, known as Velika Petka, is 648 feet high, covered with fir trees, and has reddish-brown cliffs on its seaward side. The lower peak, 479 feet high, slopes westward to Rt Petka, which is also high. There are two above-water rocks on the western side of a reef that lies about 300 yards northwestward of Rt Petka. A passage, about 100 yards wide, $6\frac{1}{2}$ to 10 fathoms deep, and suitable only for small vessels with local knowledge, lies between the reef and a spit extending eastward from the easternmost Hridi Grebeni.

Hridi Grebeni comprise a chain of barren, jagged, reddish rocks that stand on a reef, with depths of less than 5 fathoms, between about $\frac{1}{8}$ and $\frac{2}{3}$ mile westward of Rt Petka. The rocks are fairly steep-to; the 5-fathom curve lies at its greatest distance about 100 yards northward of the highest rock, which is 62 feet high. A light is shown on the 46-foot summit of the westernmost rock.

Ostrvo Koločep, the southeasternmost of the islands forming the southwestern side of Koločepski Kanal, lies with Rt Gornji, its southern extremity, about $1\frac{1}{4}$ miles west-northwestward of Hridi Grebeni. The island, about $1\frac{3}{4}$ miles long, is 410 feet high near its western extremity, has wooded slopes and cultivated valleys, but its southwestern coast is barren, rocky, and of light color.

Anchorage may be taken in 12 to 18 fathoms, mud, about 300 to 600 yards off the southwestern shore of Ostrvo Koločep; farther westward the bottom is rocky.

Two submarine cables are laid from the northwestern end of Poluotok Lapad; one extending to the southern end of Otok Daksa; and the other extending west-northwestward across Velika Vrata to the eastern side of Otok Koločep.

Velika Vrata, the southern entrance of Koločepski Kanal, lies between Hridi Grebeni and Rt Gornji. This entrance, approximately $1\frac{1}{2}$ miles in extent between the entrance points and the mainland northeastward, also leads to the port of Gruž and the inlet of Ombla, on the eastern shore, and to Luka Zaton, on the northern shore. Koločepski Kanal (sec. 10A-6) lies between the mainland northwestward of Luka Zaton and the off-lying islands northwestward of Ostrvo Koločep.

Zaliv Lapad (Sumartin Bay), open to the westward, indents Lapad Peninsula between Rt Petka and Rt Gnjišće, about $\frac{2}{3}$ mile northward. There are general depths of 6 to 12 fathoms in the bay. The southern shore is fringed by a ledge about 150 yards wide and shoal water, with depths of less than 5 fathoms, extends about 300 yards from the head of the bay. Small vessels seek temporary shelter here from the bora and the scirocco; however, it is dangerous in winter.

Rt Gnjišće, the western extremity of Lapad Peninsula, is high and wooded. A ledge, with depths of less than 5 fathoms, extends about 100 yards westward from the point. Gnjišće Bank, a small reef with a depth of 5 fathoms, lies about 200 yards northwestward of Rt Gnjišće.

The northern side of Lapad Peninsula between Rt Gnjišće and the western point of entrance of the port of Gruž (which is also the northeastern extremity of the peninsula), about $\frac{3}{4}$ mile eastward, is the southern side of the passage that forms the common entrance of the port of Gruž and the inlet of Ombla. The shore is fringed by a narrow

ledge which makes its greatest northward extension about 1/2 mile northeastward of Rt Gnjliliste. The outer edge of the 1-fathom curve of this ledge is marked by a black stone BEACON. The 5-fathom curve is charted about 120 yards northward of this beacon.

OTOCIC DAKSA, a small crescent-shaped islet with several buildings on it, lies about 1 mile north-northeastward of Hridi Grebeni in about the middle of the passage that leads to the port of Gruz and the inlet of Ombla. The islet is 79 feet high and surrounded by a ledge, about 60 yards wide, with depths of less than 9.1m (5 fm). A light is shown on the northern end of the islet.

KANAL DAKSA, the wider of the two channels leading to Ombla and Gruz, lies between Otocic Daksa and the mainland north-eastward. It is nearly 1/2 mile wide, has midchannel depths over 37m (20 fm), and is clear of dangers. The channel between Otocic Daksa and Lapad Peninsula is about 400 yards wide, has midchannel depths of 26m (14 fm) to 29m (16 fm), and is clear of dangers.

LUKA GRUZ

Position: 42°40'N., 18°05'E.
 Depths: Harbor entrance, 29m (16 fm).
 Harbor, 3.6m (2 fm) to 24m (13 fm)
 Berths, 2.4m (8 ft.) to 7.9m (26 ft.)
 Anchorages, 37m (20 fm) and 18.3m (10 fm) to 33m (18 fm)
 Tidal rise: MHWS, 1 foot; MHWN, 1/2 foot.
 Port plan: See section 9E-19.

9E-12 LUKA GRUZ is a port located about 2 1/4 miles within Velika Vrata and about 26 miles northwestward of Ostri Rt.

NAVIGATION

9E-13 See section 9E-4.

CURRENTS—WEATHER

9E-14 See section 9E-5.

DEPTHS

9E-15 In the harbor entrance there is a depth of 29m (16 fm); inside the harbor,

outside the dangers and the shoal shore bank, the depths are 9.1m (5 fm) to 24m (13 fm) in the outer 1/2 mile and decrease gradually to about 3.6m (2 fm) at the head of the harbor.

HARBOR

9E-16 Luka Gruz is entered between the northeastern extremity of Lapad Peninsula and Rt Kantafig, a triangular-shaped point about 400 yards north-northeastward, and occupies the narrow inlet that extends nearly 1 mile southeastward from the entrance points. The head and the western side of the harbor are quayed or bordered by a sea wall that is suitable only for small craft. The village of Lapad lies on the western side of the harbor and consists mainly of a line of villas and hotels.

DANGERS.—A sunken rock, with a depth of 4.6m (2 1/2 fm), lies about 50 yards off the quay in a position about 600 yards south-eastward of Rt Kantafig. It is marked by a buoy and lies on a shoal, with a depth of 9.1m (5 fm) and less, that extends from the quay to a position about 50 yards westward of the rock where it becomes steep-to. Between the rock and the quay the depths are 5.5m (3 fm) to 9.1m (5 fm).

The 5-fathom curve of the shoal shore bank on the southwestern side of the harbor lies about 250 yards southwestward of the quay. Sipak Rock, with a depth of 5m (2 3/4 fm), lies near the northeastern edge of this bank in a position about 1/4 mile southward of Rt Kantafig.

NAVIGATIONAL AIDS.—A LIGHT is shown on Rt Kantafig. Another LIGHT is shown on the head of Petka Pier.

Anchorage may be taken, 3/4 mile north-westward of the entrance to Luka Gruz between Otocic Daksa and the mainland north-eastward, in 5.5m (3 fm) to 37m (20 fm), poor holding ground of sand and mud.

ANCHORAGE IS NOT PERMITTED south-eastward of a line drawn from the beacon marking the ledge off Lapad Peninsula to Rt Loznica (Leandra Point), about 3/8 mile northeastward.

PILOTS

9E-17 PILOTAGE is compulsory for all

vessels over 500 gross tons except local coasters. Pilots must be requested 24 hours in advance. Pilots will board vessels northward of a line between Rt Gornji (9E-11), the light on Hridi Greben (9E-11), and the light on Otocic Daksa (9E-11).

REGULATION.—All vessels bound for ports in Yugoslavia from foreign ports must notify the Split coastal radio station at least 24 hours in advance on call sign YUS and/or YUT, on 500 kc.

DIRECTIONS FOR ENTERING

9E-18 Vessels entering Luka Gruz should pass midway between Hridi Grebeni and Ostrvo Kolocep and thence may pass on either side of Otocic Daksa. Kanal Daksa is clear and a midchannel course should be steered. In the southern channel, however, the northwestern side of the channel should be favored in order to avoid the ledge that borders Lapad Peninsula. In entering the port of Gruz a vessel should keep in the fairway and pass within about 100 yards of the buoy marking the rock on the eastern side of the harbor.

FACILITIES

9E-19 GRUZ (Dubrovnik II) is the town lying on the northeastern shore of the harbor at the foot of a steep terraced slope and extending about 1 1/2 miles southeastward in a single street to the suburbs of Dubrovnik. The importance of Gruz lies in the fact that it is the deep-water port of Dubrovnik and, as such, ranks as one of the largest ports in Yugoslavia. Timber and minerals are the principal exports. The population is about 2,500. The customhouse, harbor master's office, health office and railroad station are all in the town.

BERTHS.—Timber Wharf, has a berthing length of 930 feet, with depths of 7.6m (25ft.) to 12.5m (41 ft.) feet alongside.

Railway Wharf, has a berthing length of 1,330 feet, with depth of 7m (23 ft.) to 10.6m (35 ft.) alongside.

New Wharf, has a berthing length of 1,130 feet, with depths of 3.9m (13 ft.) to 6.7m (22ft.) alongside.

Petka Pier, has a berthing length of 460 feet, with depths of 3m (10 ft.) to 4.9m (16 ft) alongside.

Timber Pier has depths of 7m (23 ft.) to 7.9m (26 ft.) at its head.

Cement Wharf has a berthing length of 350 feet, with depths of 4.5m (15 ft.) to 12.9m (42 ft.) alongside.

The wharves and piers have railroad connections. Small vessels may berth alongside the wharves southward of Petka Pier, where there are depths of up to 3.9m (13 ft.) alongside.

Six cranes of 5 to 30 tons are available.

Two tugs and four 20-ton lighters are available.

SUPPLIES.—Fresh provisions are available. Water is piped to the quays and to the pier. Fuel oil can be supplied at a rate of 50 tons per hour.

REPAIRS.—Small repairs can be made. There are several divers with equipment for limited operations.

COMMUNICATIONS.—Gruz has telephone, telegraph, and railroad services and has a radio station. There is regular steamer communication with other ports in the Adriatic Sea.

MEDICAL.—There are hospitals at Dubrovnik (sec. 9E-10). The sanitary conditions of the port are good.

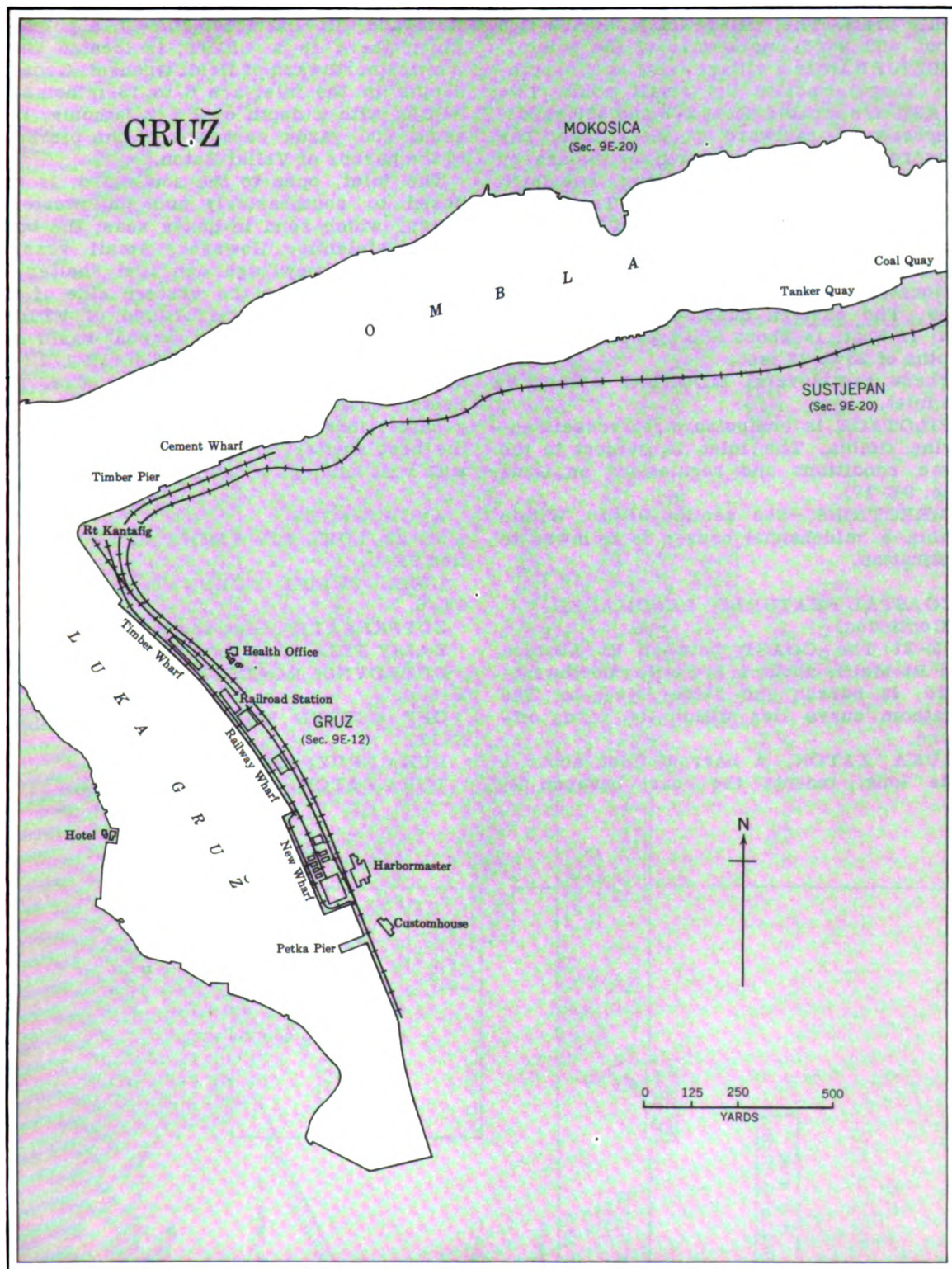
DERATTING.—Deratting can be carried out and Deratting Certificates and Deratting Exemption Certificates issued.

OMBLA

9E-20 OMBLA (Rijeka Dubrovačka), a narrow inlet extending about 2 miles eastward, is entered between Rt Kantafig and Rt Loznica, about 550 yards northwestward. The shores are rather steep-to, being fringed by a very narrow ledge. General depths in the inlet are 9.1m (5 fm) to 33m (18fm). The 5-fathom curve lies about 40 yards off the southern shore, about 80 yards off the northern shore, and about 1/4 mile from the head of the inlet.

A SUBMARINE CABLE, marked at each end by a BEACON, is laid across the inlet from a position about 200 yards eastward of Rt Kantafig.

A small point, marked by a LIGHT, projects southward from the northern shore in a position about 3/4 mile east-northeastward of Rt Kantafig. On the western side of the



point there is a small quay suitable only for small craft. The village of Mokosica lies about 400 yards northward of the point.

SUSTJEPAN is a village lying on the southern shore opposite the small point. Two QUAYS are located about 375 and 550 yards, respectively, eastward of the village. The western quay, a tanker berth for the nearby oil installations, is 50 feet long. The depth is 26 feet, 6 feet off the quay. Tankers up to 460 feet in length have berthed here. Two pipelines are laid on this quay. There are bollards on the shore; a WARPING BUOY is located close west-northwestward of the quay. The eastern quay, where a stock of coal is kept, is about 250 feet long and has depths of 23 to 26 feet.

There are several MOORING BUOYS in the inlet.

PILOTAGE is compulsory for vessels entering Ombla. The inlet is subject to the same conditions and regulations as Gruz (sec. 9E-17).

DIRECTIONS.—See section 9E-18. Within Ombla a midchannel course is followed to destination.

COASTAL FEATURES—LANDMARKS

(Continued)

9E-21 The COAST between Rt Loznica and Rt Malfi, about 1 1/4 miles northwestward, is barren and rather steep-to. The 5-fathom curve lies within 100 yards off-shore.

LUKA ZATON, a narrow inlet about 1 mile long, indents the coast between Rt

Malfi and Rt Bat, about 1/3 mile west-northwestward. Rt Bat (sec. 10A-1), a point on which there is a LIGHT, is located about 2 miles northward of Hridi Grebeni. General depths in the inlet are 6 to 13 fathoms. A ROCK, with a depth of 2 1/2 fathoms, lies about 200 yards eastward of the pierhead in the harbor of Veliki Zaton.

The inlet, open to the southward, is exposed to southeasterly and southwesterly winds, which send in heavy seas; the bora blows violently. However, small vessels with local knowledge can find shelter in the three coves on the western side of the inlet. The harbor and village of VELIKI ZATON, where there is a boat basin and a small pier with a depth of 12 1/2 feet at its head, lies in the southern cove. The center cove, known as Soline, makes the greatest indentation in the inlet and affords the best shelter. There are several villages with boat landings about the inlet.

ANCHORAGES

9E-22 LUKA MALIMOLUNAT.—See section 9E-6.

LUKA VELIKI MOLUNAT.—See section 9E-6.

ZUPSKI ZALIV.—See section 9E-7.

ZALIV TIHA.—See section 9E-8.

DUBROVNIK ROADSTEAD.—See section 9E-8.

OFF OSTREVO KOLOCEP.—See section 9E-11.

LUKA GRUZ.—See section 9E-16.

LUKA ZATON.—See section 9E-21.

CHAPTER 10

SOUTHERN COAST OF YUGOSLAVIA FROM RT BAT TO RT PLOČA. INCLUDING OFF-LYING ISLANDS AND CHANNELS

Part A. Rt Bat to Rt Podkapeć, including islands and channels south of Ostrvo Hvar.

Part B. Rt Podkapeć to Rt Ploča, including islands and channels north of Ostrvo Hvar.

Plan.—The mainland coast of Yugoslavia embraced by this chapter is described in sequence northward, except that part bordering Neretvanski Kanal which is described in sequence southward, this channel having no southern outlet.

The bounding islands of the channels are described first in general terms followed by particular description of the channels separating them. The description sequence of these channels is logically arranged for vessels proceeding either northward or eastward. Mljetski Kanal and Lastovski Kanal are described in sequence northward and westward, whereas the other principal channels, Korčulanski Kanal, Hvarski Kanal, and those in the approaches to Split are described in sequence to eastward.

GENERAL REMARKS

10-1 From Rt Bat, the mainland coast trends about 95 miles northwestward, thence about 24 miles westward to Rt Ploča. The southern part of this coastline is without a major indentation except for those lying at the root of and eastward of Poluotok Pelješac. The coast is steep-to with considerable depths inshore and is backed closely by mountainous country. The extreme northern part of this stretch of coast is much indented and contains varied parts of cultivated and barren coastal sections backed farther inland by high mountains. The entire coast is fronted by rocky islands peculiarly disposed so that their axes lie in a general east-west direction; between them are deep water channels.

PART A. RT BAT TO RT PODKAPEĆ INCLUDING ISLANDS AND CHANNELS SOUTH OF OSTRVO HVAR

10A-1 Rt Bat ($42^{\circ}41' N.$, $18^{\circ}03' E.$) is the extremity of a triangular-shaped peninsula

that forms the western side of Luka Zaton and situated 1 mile north-northwestward of Otočić Daksa. The point is 45 feet high, steep-to, and is marked by a light.

COAST—GENERAL

10A-2 Between Rt Bat and Rt Podkapeć, about 43 miles northwestward, the mainland coast is steep-to with considerable depths inshore and is backed a short distance inland by mountainous country with but little intervening space of cultivated ground.

At a position about 10 miles southeastward of Rt Podkapeć, Rijeka Neretva, one of the largest rivers in Yugoslavia, pierces the coastal mountain range and enters the sea through marshy ground.

Poluotok Pelješac, a narrow mountainous peninsula, juts about 35 miles northwestward from a position 16 miles northwestward of Rt Bat. The sides of the peninsula fall steeply into the sea except on its outer southwestern side where there is a narrow cultivated and populated area.

Off-lying this stretch of coast are a number of islands, islets and rocks, the outermost being Otočić Jabuka, situated 81 miles westward of Rt Podkapeć. Deep water channels lie between the islands. Mljet, Lastovo, Korčula and Vis are the most important of these islands; the others are thinly populated or uninhabited.

DANGERS

10A-3 The mainland and off-lying islands along this stretch of coast are generally steep-to and there are no hidden dangers beyond $\frac{1}{2}$ mile offshore of the coast, the islands and islets, and above-water rocks, with the exception of Lastovski Otočići (Isolotti Lagostini) (sec. 10A-15), and Pličina Jabuka (sec. 10A-25).

NAVIGATION

10A-4 Offshore.—The eastern Adriatic coastal track of 322° for northbound vessels from a midchannel position in the Strait of Otranto to a midchannel position in Biševski Kanal, a distance of 207 miles, leads clear of all dangers and, with the exception of the bounding islands of this channel, closes land nearest at a position 6 miles southwestward of Ostrvo Sušac.

Inshore.—With the exception of the area of Lastovski Otočići (Isolotti Lagostini) and Pličina Jabuka, the eye is the best guide for navigation, and, as mentioned previously, no hidden dangers lie beyond $\frac{1}{2}$ mile offshore of the coast, the islands and islets, and above-water rocks.

CURRENT AND WIND

10-5 Current.—Between Rt Bat and Rt Podkapeć the coastal current flows toward the northwest along the open coast and in the channels with a mean velocity of 0.5 knot. The tidal current affects somewhat the coastal current; the ebb is stronger than the flood. When the ebb flows in the same

direction as the coastal current the resultant velocity may reach 1 knot along the open coast and in the larger channels, and 1.5 knots in the more constricted channels. Persistent winds from the northwest or southeast decrease or increase, respectively, the velocity of the current.

One branch of the northwesterly coastal current is diverted southwestward from the vicinity of Ostrvi Lastovo and Mljet toward Ostrvi Palagruž (Isole Pelagosa) (sec. 4A-14). This branch of the current attains a velocity of from 0.5 to 1 knot, and is unaffected by wind or tide.

Wind.—Between Rt Bat and Rt Podkapeć the bora blows with violence, especially close to the mainland, attaining its greatest force at the mouth of Rijeka Neretva, and in Zaton Žuljana on the southern side of Poluotok Pelješac. In general, the bora blows more steadily and with less force in the vicinity of Ostrvo Vis than leeward of Ostrvo Hvar and the mainland. A local indication of an arriving bora is the formation over the coastal mountain peaks of white clouds from which radiate small plumes. In the vicinity of Ostrvo Vis, the bora is presaged a few hours by the formation, on the northeastern horizon, of white cumulus over a bank of dark compact clouds.

When the sky becomes lead-colored it indicates a violent bora accompanied sometimes by gusts of hurricane force, which last briefly. With this indication present the first violent gusts from the north or north-northeast are preceded by a brief period of calm.

The scirocco blows through the channels between the islands and brings fog. It is forecast by the formations of clouds on the mountain summits of the mainland and principal islands; frequently the atmosphere becomes so clear that vessels can sight Promontorio del Gargano. The scirocco and the libeccio cause high seas and strong ebb

tidal current on the western sides of the islands.

In summer, the night land breeze from the east and the day sea breeze from the northwest or west becomes established near the mainland coast.

KOLOCEPSKI KANAL

10A-6 KOLOCEPSKI KANAL, about 5 miles long and 3/4 mile wide at its narrowest part, lies between the mainland coast and a chain of islands, close northwestward of Dubrovnik. This channel and a bay, about 3 miles in diameter, at its northwestern end provide communication with Luka Slano, Stonski Kanal (Kanal Stona Velikog), and several minor harbors. The channel and bay have depths of 14 to 35 fathoms and is free of dangers. It is easy to enter at all seasons and affords good anchorage almost throughout over good holding ground.

The principal islands of the chain forming the southwestern side of the channel are Kolocep, Lopud, and Sipan; those forming the southern side of the bay are Sipan, Jakljan, and Olipa. Ostrvo Kolocep lies with Rt Gornji, its southern extremity, 1 3/4 miles southwestward of Rt Bat.

The channel is entered from SOUTHWARD between Hridi Grebeni and Otocic Daksa (sec. 9E-11), on the eastern side, and Rt Gornji (42° 40' N., 18° 01' E.), 1 1/4 miles northwestward of Hridi Grebeni, on the western side. Otocic Sveti Andrija, a small bare islet, 167 feet high and marked by a LIGHT, lies 3 miles west-southwestward of Rt Gornji.

The bay and channel are entered from NORTHWARD between Otocic Olipa, on the northern side, and Rt Seka, the northwestern extremity of Ostrvo Jakljan, about 1/2 mile southeastward, on the southeastern side. Ostrvo Jakljan can be identified by its blanché central stony peak, 738 feet high.

Otocic Olipa, whose summit is 692 feet high, is rocky and uncultivated; its southern point is marked by a light. Otocic Tajan lies on the southern side of the entrance close northeastward of Rt Seka. A LIGHT is shown on the western extremity of the islet. A LIGHT marks Rt Tiha, the northeastern point of Ostrvo Sipan.

A LIGHT is shown near Trsteno in a position about 4 miles northwestward of Rt Bat.

LOPUDSKA VRATA, the MIDDLE entrance to Kolocephal Kanal, lies between Ostrvo Lopud, on the southeastern side, and Ostrvo Sipan and Otocic Ruda, on the northwestern side. This passage has deep water and a minimum width of about 3/4 mile. Shallow water on which there is a rock, 10 feet high, extends about 400 yards northwestward of Otocic Ruda.

10A-7 GENERAL DESCRIPTION OF ISLANDS.—Ostrvo Kolocep, the southeasternmost of the chain forming the southwestern side of Kolocephal Kanal, is 410 feet high at its western end and its southern peak is tree-covered. The southern extremity of the island is marked by a LIGHT. Ostrvo Lopud, adjacent northwestward, is 70 feet high. Its growth of trees and bush give it a dark appearance in contrast with the bareness of the southwestern side of Kolocep. Ostrvo Sipan, northwestward of Lopud, is the largest and most populated of the chain. It is 794 feet high at its northern part and a prominent conical hill, 732 feet high, rises about 2 miles from its southeastern extremity; its shore is rocky and bold.

LUKA LOPUD, situated at the head of a cove on the northwestern side of Ostrvo Lopud, consists of a small harbor formed by a breakwater. Small vessels can moor at the breakwater. A light is shown from the breakwater. Anchorage, in 11 to 22 fathoms, can

be taken near the east coast of Luka Lopud.

SIPANSKI LUKA lies at the head of an inlet entered from northwestward between the northern part of Ostrvo Sipan, on the northeastern side, and Ostrvo Jakljan, on the southwestern side. Vessels anchor in the inlet in 16 to 33 fathoms. A **LIGHT** is shown at the town near the head of the inlet.

LUKA SLANO (42° 47' N., 17° 53' E.) is entered between Rt Donji, situated on the mainland 9 1/2 miles northwestward of Rt Bat, and Rt Gornja, about 400 yards south-southeastward. The bay, about 1 mile long, is landlocked and provides protection from southerly winds. A shallow reef extends about 130 yards eastward from Rt Donji. Depths in the center of the bay are from 6 to 17 fathoms. At the head of the bay is a quay with a depth of 8 1/2 feet alongside. Anchorage can be taken anywhere in the middle of the bay in 6 to 17 fathoms over good holding mud. Rt Donji and the southern corner of the quay are each marked by a **LIGHT**.

COASTAL FEATURES

10A-8 POLUOTOK PELJESAC—GENERAL DESCRIPTION.—This remarkable peninsula juts about 38 miles northwestward from the mainland northward of the bay at the head of Kolocepski Kanal, 13 miles northwestward of Rt Bat. The peninsula, where it is joined to the mainland, is narrowed to an isthmus a trifle less than 1 mile wide by Kanal Stona Malog, on its northern side, and by Stronski Kanal, on its southern side. Two parallel mountain ranges with steep sides form the peninsula. At a position about 5 miles from its root, the peninsula attains its greatest width of 4 1/2 miles, thence, for a distance of 2 1/2 miles it narrows to a width of 1 3/4 miles, from which position northwestward it again broadens to an average width of 2 1/4

miles. At the narrow part, the two mountain ranges join and form a conspicuous saddle which can be identified from afar. Vrh Vipera, the highest peak of the peninsula, rises to 3,153 feet at a position 7 1/2 miles from Rt Lovisce, the peninsula's northwestern extremity. Between the steep declivities of the mountains are well cultivated fertile valleys.

STONSKI KANAL (Kanal Stona Velikog) is an inlet in the southeastern end of Poluotok Peljesac, entered from the bay northwestward of Kolocepski Kanal between Rt Grbljava, on the northeastern side, and Rt Veljare, about 3/4 mile southwestward, on the southwestern side. The southeastern end of the inlet, from the entrance to the village of Broce, a distance of 3 miles, varies from 3/4 to 1/4 mile wide with steep sides and has depths of 4 3/4 to 30 fathoms. The narrow northeastern part of the inlet, about 1 1/2 miles long, is dredged to a depth of about 8 feet. On either side of the channel are the remains of numerous wooden beacons.

At Broce there is a jetty with about 6 feet alongside. At Ston, at the head of the inlet, there is a short mole and a quay.

A good **ANCHORAGE** for large vessels in about 10 fathoms, extends for a distance of 3 miles from the entrance under the northeastern shore.

NAVIGATIONAL AIDS.—Rt Grbljava, the jetty at Broce and the mole at Ston are each marked by a **LIGHT**.

A **LIGHTED BEACON** is about 3/4 mile northwestward of Broce.

The dredged channel to Ston is marked by buoys and beacons.

A **LIGHT** is shown on the head of the mole at Doli in a position about 1 1/4 miles north-northeastward of Rt Grbljava Light.

OFF-LYING ISLANDS AND CHANNELS—OSTRVO MLJET

10A-9 General description.—Ostrvo Mljet is the southeasternmost of the larger islands lying off this part of the coast and lies with Rt Gruj ($42^{\circ}41' N.$, $17^{\circ}45' E.$), its southeastern extremity, 4 miles south-southwestward of Otočić Olipa (sec. 10A-6). This island is 20 miles long and about 2 miles wide, and consists of a chain of wooded hills having a deep depression situated about one-third of its length from its eastern end, and appears from northward like two groups of islets. The island's summit, Vrh Veliki Grad, 1,686 feet high, is near the center. The northern side of the island is wooded and cultivated; the southern side is rocky and sterile, except towards the western end there is a pine forest. The northern coast is easy of access and has several anchorages. A few rocks and islets lie off the southern coast, but none at a greater distance than $\frac{1}{2}$ mile. There are no secure anchorages off the southern coast and it should not be approached closely.

MLJETSKI KANAL

10A-10 Mljetski Kanal lies between Ostrvo Mljet and Poluotok Pelješac; it is about 17 miles long and has a minimum width of about 3 miles. It is entered from southeastward between Rt Gruj and Rt Vratnik, the southeastern extremity of Poluotok Pelješac, and from northwestward between Rt Goli, the western point of Ostrvo Mljet, and Hrid Dingački školj, closely off-lying the northwestern entrance point of Zaton žuljana (sec. 10A-12). The northeastern side of the channel is high and of a whitish aspect, with scattered patches of brushwood, and is backed by high land, the mountains rising directly above it.

The fairway of the channel has depths of 24 to 47 fathoms and is clear of dangers.

Pelješki Kanal (sec. 10A-31), entered

from southeastward between Rt Ražnjić and Hrid Dingački školj at the junction of Mljetski Kanal and Lastovski Kanal, offers the best sheltered anchorage for large vessels in the vicinity.

Luka Sobra ($42^{\circ}44' N.$, $17^{\circ}37' E.$), on the northern shore of Ostrvo Mljet, is entered between Rt Pusti, 7 miles west-northwestward of Rt Gruj, and a point about $\frac{1}{2}$ mile southeastward. Otočić Badanj lies close off this point. Hrid Seperka lie on a reef extending more than 200 yards northeastward of Rt Pusti. The harbor consists of two bays; the village of Sobra lies at the head of the western bay where there is a short quay available for boats only. A point close northwestward of the village is fringed by a reef and a sunken rock lies close off the northern shore of this bay. Luka Sobra is easily identified, being near the depression in Ostrvo Mljet, previously mentioned. Rt Pusti is marked by a light.

Anchorage in the harbor is generally unreliable on account of the rocky bottom and vessels frequently lose their anchors. Vessels can anchor in 22 fathoms over sand in the western bay.

A dangerous wreck lies sunk in about $9\frac{3}{4}$ fathoms about 55 yards off the head of the quay.

10A-11 Luka Polače ($42^{\circ}48' N.$, $17^{\circ}24' E.$), on the northern shore of Ostrvo Mljet, is entered between Rt Stupa, located $3\frac{1}{2}$ miles east-northeastward of Rt Goli, and Rt Križice, about $2\frac{1}{4}$ miles east-southeastward. The entrance to the harbor is occupied by four rocky islets; Otočić Kobrača, the largest and easternmost, lies parallel with the coast with a narrow sheltered channel between. This islet has two hills with a saddle between. Otočić Moračnik, 331 feet high, lies on the western side of the entrance close to Rt Stupa. Otočić Ovrat, 105 feet high, lies between the other two islets and is easily recognized by its bare steep sides. Otočić Tajnik is the innermost. Hrid Kula, marked

by a light, lies just southward of the middle of the entrance to the channel between Otočić Kobrava and Rt Križice.

The harbor is westward of the western islets and is considered one of the best in the islands off this part of the coast, but the space is limited. In the southwestern part of the harbor there is a quay for shallow draft craft and a small jetty with a depth of about 16 feet at its head.

Anchorage can be taken as follows: in 12 fathoms about 450 yards northeastward of the village; in 19 fathoms westward of Otočić Tajnik; and in 23 fathoms about 1,400 yards westward of Hrid Kula.

Directions for entering.—In making for Luka Polace, Rt Goli will be readily identified; the land is wooded and the four islets in the entrance present a barren whitish aspect. A large vessel should steer along the northern or southern shore of Otočić Kobrava.

Luka Pomina ($42^{\circ}47' N.$, $17^{\circ}20' E.$) is sheltered by the projection of which Rt Goli, 154 feet high, is the western termination. The harbor which has two arms, a southern and an eastern, is formed by this projection and the coast eastward of it. It is sheltered northward and northeastward by Hrid Galicija and Otočić Pomeštak. The former, a grayish colored rock, about 30 feet high, lies close off the southwestern extremity of Otočić Pomeštak and is connected to it by a shallow ridge. Otočić Pomeštak lies with its southwestern extremity about 1 mile east-northeastward of Rt Goli and is connected to the coast southeastward by a shoal with 3

fathoms over it. This islet is 148 feet high, whitish at the base, and covered with brushwood. The harbor is entered between Hrid Galicija and a point about 560 yards westward. Hrid Crna Seka, 13 feet high, lies on a reef about 350 yards long about 300 yards northeastward of the western entrance point.

Anchorage, in 22 fathoms, can be taken southward of Hrid Galicija and Otočić Pomeštak. Small vessels anchor, in 11 to 16 fathoms, in the southern arm.

10A-12 Zaton Žuljana, on the northwestern side of Mljetski Kanal, is entered between Rt Prezdra ($42^{\circ}52' N.$, $17^{\circ}26' E.$) and a point about $3\frac{1}{2}$ miles northwestward. Hrid Dingački Skolj, bare and eroded, lies close eastward of the latter point. Otočić Lirica lies about 500 yards off Rt Prezdra from which it is separated by shallow water about 9 feet deep. The high land on the northern side of the bay slopes abruptly to a conspicuous valley. Within the bay the depths are considerable, except for one sunken rock, about 400 yards westward of the northern of two flat above-water rocks lying close off a point which divides two coves on the southeastern side of the bay.

Uvala Žuljana lies at the head of the northern of the two coves, previously mentioned. A short breakwater extends northward from the western end of the quay on the southern side of the cove. Small craft can secure to the inner side of the breakwater. Two patches with depths of less than 6 feet lie close eastward of the head of the breakwater.

LUKA TRSTENIK is situated at the head of a cove at the northern part of Zaton Zuljana, about 1 1/2 miles eastward of Hrid Dinjacki Skolj. A breakwater extends about 328 feet eastward from the southern end of the quay, which is about 289 feet long, located on the western side of the harbor. Small vessels can secure alongside either the quayed inner side of the breakwater or the quay where there are depths of about 13 feet.

ANCHORAGE.—Small vessels can anchor southeastward of the breakwater, in 16 fathoms, with lines run to the northeast coast.

Otocic Lirica and the head of the breakwater both Uvala Zuljana and Luka Trstenik are marked by **LIGHTS**.

OSTRVO LASTOVO (ISOLA LAGOSTA) AND CONTIGUOUS ISLANDS AND ISLETS

10A-13 GENERAL DESCRIPTION.—The Lastovo group, lying westward of Ostrvo Mljet, occupies a position about 29 miles long in an east-west direction and about 5 1/2 miles in a north-south direction. Lastovski Kanal lies between this group, on the southern side, and Ostrvo Korcula (Isola Curzola) (sec. 10A-16), on the northern.

OSTRVO LASTOVO lies with Rt Nori Hum (42°46'N., 16°57'E.), its eastern point, about 17 miles westward of Rt Goli, the western extremity of Ostrvo Mljet. The island is 6 miles long from Rt Nori Hum to Rt Cuf, its western extremity, and about 3 miles wide from Rt Struga, on the southern coast to the northern coast. A mountainous mass of three peaks rises in the center of the island over the other mountains, all of which are wooded and partly cultivated. Vrh Sveti Juraj, 1,368 feet high, is the loftiest of the

summits. The coast is rocky and cliffy and, with the exception of the southeastern side, is indented and steep-to, except for reefs lying in places as much as 600 yards off-shore.

LUKA SVETI MIHAJLO is situated about 2 1/4 miles westward of Rt Nori Hum on the northern shore of Ostrvo Lastovo and on the western side of an islet, 20 feet high, which is connected to the coast by a shallow spit, forming a small basin with a quay which is marked by a **LIGHT**.

SKRIVENA LUKA (Porto Rosso).—Between Rt Struga, the southeastern extremity of the island, and Rt Veljega Mora, a point 1 1/2 miles westward, there is a bay, the western half of which contains several reefs, on of which has a depth of 6 feet. Skrivena Luka is a small cove containing several moles for boats located at the eastern side of the bay and entered between the headland of Rt Struga and Rt Strazica, about 400 yards northward.

ANCHORAGE.—The eastern part of the bay between Rt Struga and Rt Veljega Mora affords anchorage to vessels of deep draft but it is unsafe and should be resorted to only in a bora or during westerly winds.

Rt Stuga and Rt Strazica are each marked by a **LIGHT**.

10A-14 LUKA VELJI LAGO and LUKA MALI LAGO lie on the northwestern side of Ostrvo Lastovo and between it and Ostrvo Prezba (Isolotto San Giorgio).

LUKA VELJI LAGO (42°45'N., 16°49'E.) is entered between Rt Cuf, the northern point of Poluotok Baski Rat, a peninsula extending about 3/4 mile from the southwestern end

of Ostrvo Lastovo, and the southern end of Ostrvo Prezba, about 700 yards northwestward. A reef fronts Rt Cuf for 150 yards northwestward. Two islets lie in the approach to Luka Velji Lago; Otocic Vlasnik, 295 feet high and wooded, lies about 300 yards westward of the southern end of Ostrvo Prezba; Bratin Otok, 262 feet high, whitish and also wooded, lies 900 yards westward of Rt Cuf. The sides of Luka Velji Lago are steep and for the most part thickly overgrown; they are fringed narrowly by shallow water. Otocic Makarac, 82 feet high and with a church on it, lies near the center of the northern part of the harbor. This islet is surrounded by shallow water for a distance of about 100 yards. On the western side of the harbor are two coves; the northern one is closed to traffic. A narrow inlet leads from the southeastern part of the harbor to Ubli where there is a small quay for boats. A LIGHT is shown from the quay.

LUKA MALI LAGO is entered from northeastward between Ostrvo Prezba and Otocic Maslovnjak Velji, 105 feet high, on the northwestern side, and Rt Zrvanj, which has a conical summit 223 feet high, on the southeastern side. The inner and wider harbor lies southward of Rt Zrvanj and is entered by a sharp 090° turn to southeastward. The inner entrance points should be given a berth of at least 75 yards, which leaves a channel about 200 yards wide.

A narrow boat channel with a depth of 1 foot connects the two harbors.

The southeastern point of Ostrvo Prezba and the quay at Ubli are each marked by a LIGHT.

ANCHORAGES.—There are a number of an-

chorages for medium size vessels which can be taken anywhere in Luka Velji Lago. There are two berths of 600 yards diameter; one lies directly southward of Otocic Makarac in 6 to 29 fathoms; the other lies directly southward of the former in 15 to 28 fathoms, both over sand and shells.

Anchorage can be taken in Luka Mali Lago southward of Rt Zrvanj, in 21 to 22 fathoms. Smaller vessels anchor, in 7 to 9 fathoms in the southwestern part of the harbor.

DIRECTIONS FOR ENTERING.—Luka Velji Lago may be approached either between Otocic Vlasnik and Bratin Otok, or between Bratin Otok and Rt Cuf. If the former is used, both islets should be given a berth of 200 yards.

10A-15 ISLETS AND DANGERS EASTWARD OF OSTRVO LASTOVO.—These islets and dangers are divided into two groups, a western and eastern.

OTOCI DONJISKOLJI are the western group and consist of four principal islets, together with many smaller islets and rocks, ranging in height from barely above water to 272 feet. The easternmost dangers of this group are; Otocic Tajan Velji, 49 feet high, situated 3 1/2 miles northeastward of Rt Nori Hum and Hrid Mrkjenta Bijela, a whitish rock, 10 feet high, situated 3 1/4 miles east-northeastward of the same point.

A LIGHT is shown on the western extremity of Otocic Tajan Velji.

OTOCI VRHOVNJACI, the eastern group, consist of a number of islets, rocks, and reefs forming a line of breakers. The easternmost is Otocic Glavat (42°46'N., 17°09'E.), 72 feet high and bare, steep-to except on its

western side, situated $7\frac{3}{4}$ miles westward of Rt Goli and about 9 miles eastward of Rt Nori Hum. Otočići Sestrice, two islets close together, the higher of which is 39 feet high, are the westernmost islets of this group located $3\frac{1}{4}$ miles westward of Otočić Glavat, and the westernmost danger is a 4-fathom patch, about $\frac{3}{4}$ mile west-northwestward of these islets.

Otocic Glavat Light is shown on the islet. This light is obscured over all islets and dangers westward of it.

Caution.—The clear passage between the western and eastern groups of Lastovski Otočići is about $2\frac{1}{4}$ miles wide, but the current is irregular and at times strong.

The passage between the western group and Ostrvo Lastovo is about $\frac{1}{2}$ mile wide and great caution is required in its navigation.

As the currents in the vicinity of all these islets may be strong or irregular, it is advisable to give the islets a wide berth. Vessels prefer passing between Otočić Glavat and Ostrvo Mljet.

Islets westward of Ostrvo Lastovo.—Between Ostrvo Prežba and Otočić Bijelac, the westernmost off-lying islet, situated 6 miles westward of Rt Cuf, are a number of islets and rocks. The principal islets of this group are Otočić Mrčara, 397 feet high and composed of several wooded hillocks, situated close westward of Ostrvo Prežba, and Otočić Kapište, 305 feet high, situated about $2\frac{1}{2}$ miles west-southwestward of Otočić Mrčara.

Hrid Pod Mrčara, an isolated 36 feet high rock about $\frac{1}{2}$ mile northwestward of Otocic Mrčara, is marked by a light. A rocky $2\frac{1}{2}$ -fathom patch exists close westward of this rock.

An isolated 5-fathom reef lies about 800 yards off the southwestern end of Otocic

Kopište. Otočić Bijelac ($42^{\circ}45' N.$, $16^{\circ}41' E.$), 52 feet high, is steep-to and has light-colored vertical sides. There are no hidden dangers 400 yards offshore of any of the islets in the passage between Otočić Kapište and Otočić Mrčara; there is a $5\frac{3}{4}$ -fathom patch about $\frac{3}{4}$ mile eastward of the latter islet. The currents here are rapid.

Ostrvo Sušac ($42^{\circ}46' N.$, $16^{\circ}30' E.$) is the westernmost of the Lastovo group and lies with Rt Na žene, its eastern point, about $6\frac{1}{4}$ miles westward of Otočić Bijelac. This island constitutes a good point of reference for vessels proceeding on the offshore coastal track. The island is about 2 miles long; its southwestern part, 269 feet high, is separated from its northeastern part which is 797 feet high by low land and from a distance appears as two islets. Its sides are mostly cliffy and steep-to.

A light is shown near the southwestern end of the island.

OSTRVO KORCULA (ISOLA CURZOLA)

10A-16 General description.—Ostrvo Korčula is one of the most important islands of Yugoslavia. It is 26 miles long and $4\frac{1}{2}$ miles wide at its broadest part. The island is situated with its eastern third closely overlapping the northwestern part of Poluotok Pelješac (sec. 10A-8), from which it is separated by Pelješki Kanal. Rt Ražnjić ($42^{\circ}55' N.$, $17^{\circ}12' E.$) (sec. 10A-34), its eastern extremity, is located $7\frac{1}{2}$ miles westward of Hrid Dingački Školj, at the northwestern entrance to Zaton Žuljana. A chain of tree-covered mountains extends about 8 miles westward from Rt Ražnjić to Vrh Klupca, 1,863 feet high, thence, westward, the mountains fork into two ranges forming a broad valley. The valleys and lower ground are fertile and cultivated. The coast is nearly

everywhere steep-to. The southwestern shore is fronted by many islets, some lying nearly $1\frac{1}{2}$ miles offshore. The island is separated from Ostrvo Lastovo and Lastovski Otočići to southward by Lastovski Kanal.

10A-17 Zaliv Vela Luka.—The western end of Ostrvo Korčula terminates in two peninsulas, between which lies Zaliv Vela Luka. Vela Luka is situated at the head of the bay. The depths in the middle and southern parts of the bay, and in the approach to Vela Luka are 8 to 48 fathoms.

The peninsula forming the southern entrance point of the bay terminates at Rt Velo Dance, to southward, and Krnji Rat, about $\frac{1}{2}$ mile northward. These points are low in comparison with the backing land. A light is shown on Rt Velo Dance. Hrid Čančir, dark and low, lies close northwestward of Rt Velo Dance. The northern entrance point is formed by Otočić Proizd which lies close off the northern peninsula and to which it is connected by a reef having a depth of 5 feet in the fairway. A reef extends about 500 yards from the western end of the islet. Otočić Proizd, 79 feet high, has steep, jagged shores of whitish color which stand out prominently from afar.

The northern shore of the bay from Otočić Proizd to Rt Vranac, about 4 miles east-southeastward, is indented with numerous coves. On the southern shore, Uvala Potplat lies between Krnji Rat and Rt Vranina, about $1\frac{1}{2}$ miles northeastward. From Rt Vranina, the southern shore trends 2 miles east-northeastward to Uvala Bobovišće which forms the western side of Vela Luka.

Otočić Kamenjak, 49 feet high, bare, rocky, and steep-to, lies about $2\frac{1}{2}$ miles east-southeastward of the western point of Otočić Proizd and about $\frac{1}{2}$ mile off the northern shore of the bay. A detached $3\frac{1}{4}$ -fathom patch lies about 900 yards west-southwestward of Otočić Kamenjak, and a detached $5\frac{1}{4}$ -fathom patch lies about $\frac{3}{4}$ mile west-northwestward.

Otočić Ošjak, 213 feet high and wooded, is situated on the southern side of the bay, 1 mile east-northeastward of Rt Vranina and 300 yards offshore.

Lights.—Rt Proizd, the western point of Otočić Proizd, the southern point of Otočić Kamenjak, and Rt Vranac are each marked by a light.

Anchorage.—There are two recommended anchorage berths for ocean-going vessels. One with a diameter of 200 yards in a depth of 12 to 19 fathoms lies with its center 300 yards east-southeastward of the northeastern point of Otočić Ošjak. The other berth with a diameter of 600 yards in a depth of 18 to 26 fathoms lies with its center 700 yards east-northeastward of the same reference point. The bottom under the center of both berths is sand, but in taking position, precaution must be exercised to avoid a tongue of bed rock that extends nearly 600 yards from the southern shore between these berths.

The most secure anchorage for small vessels is in Uvala Plitvine, $\frac{1}{4}$ mile northwestward of Rt Vranac, in 8 to 13 fathoms over mud and sand.

Small vessels with local knowledge can also anchor in Uvala Gradina, located about 1,200 yards north-northwestward of Otočić Ošjak. There is a depth of 12 to 15 feet. The peninsula of Sveti Ivan forms the southern side of this bay. The entrance is divided into two passages by Otočić Gubeša, northward of which is the preferred channel.

Directions for entering.—A prominent mountain, 1,673 feet high, rising over the southern side of Zaliv Vela Luka and which appears as two conical summits with a saddle between when viewed from northward or southward, indicates the position of the bay's entrance. On nearer approach, a vessel will identify the whitish-sided Otočić Proizd, and Otočić Ošjak in the harbor. From a position not less than 1 mile southward of Rt Proizd,

a course may be steered for Otocić Osjak, passing southward of Otocić Kamenjak and the 3 1/4-fathom patch. The church in Vela Luka in range with the light structure on Rt Vranac, bearing 094°, leads to the anchorage and clear southward of the 3 1/4-fathom patch.

VELA LUKA lies at the head of Zaliv Vela Luka and is entered southward and eastward of Rt Vranac. A depth of about 16 feet exists in the fairway to the projecting quay, from which position, shoreward and in the arm extending northward, the depths reduce gradually. The town of Vela Luka, population about 6,000, is situated on the southern and eastern shores of the harbor, which are quayed and have several short moles with alongside depths everywhere suitable only for boats. A quay about 270 feet long projects about 100 feet from the southern side of the town and has depths of 7 to 12 feet alongside its face. There is a short mole eastward of the projecting quay with a depth of about 7 feet at its head.

The western corner of the projecting quay is marked by a LIGHT.

Anchorage, in 16 to 27 fathoms, can be taken eastward of Otocić Osjak.

A submarine pipeline extends, from a point on shore 400 yards eastward from Rt Vranac Light, south-southeastward to the opposite shore. A submarine cable extends, from a point 700 yards northeastward from Rt Vranac Light, eastward to the opposite shore.

LASTOVSKI KANAL

10A-18 GENERAL DESCRIPTION.—Lastovski Kanal is a continuation westward of Mljetski Kanal and lies between Ostrvo Lastovo and Lastovski Otocić, on its southern side, and Ostrvo Korčula, on its northern. The channel has a width of about 6 miles clear

of dangers and has depths of 30 to 65 fathoms. Otocić Tajan Velji (sec. 10A-15), is the farthest off-lying islet.

The normal westerly current sets through Lastovski Kanal, and, when accelerated by easterly winds, eddies are formed at the western entrance. The bora blows strongly in this channel during winter.

For Peljeski Kanal, see section 10A-31.

The islets on the SOUTHERN SIDE of the channel have been described in section 10A-15.

On the NORTHERN SIDE of the channel, the southern coast of Ostrvo Korčula, between Rt Raznjic and Rt Veli Zaglav, about 15 1/2 miles westward, is rocky and steep-to, sparsely inhabited and thinly wooded. With the exception of a few coves available for small vessels, it is without shelter.

The coast between Rt Veli Zaglav (42° 54' N., 16° 51' E.) and Rt Zaglav Veli, 6 miles west-northwestward, is fronted by a chain of islets, rocks, and reefs lying from 250 to 1,100 yards offshore. Small vessels with local knowledge can find excellent shelter between these islets and the shore.

LUKA BRNA with two narrow arms separated by Rt Mali Zaglav is entered between Rt Veli Zaglav and a point 1,200 yards west-northwestward. Rt Veli Zaglav is 240 feet high and well wooded. A 3-fathom isolated rocky patch lies 300 yards westward of this point. The village of Brna is located on the northwestern shore of the eastern arm and is fronted by a quay and a short mole suitable only for small craft. The southeastern part of Rt Mali Zaglav is marked by a LIGHT and the western extremity of Rt Veli Zaglav is marked by a LIGHT. Small vessels can anchor in 3 to 5 fathoms over sand at the head of the eastern arm. An ANCHORAGE berth, 600 yards in diameter, in about 23 fathoms lies close off Rt Mali Zaglav.

LUKA TRI LUKE lies between Rt Zaglav Veli and Rt Kljuc, 2 1/4 miles westward. Four islets extend 2 miles southeastward from the latter point. Otocic Lukovac, the southeasternmost and smallest islet, is rounded and 55 feet high. Hrid Gredica, 19 feet high, lies about 750 yards northward of Otocic Lukovac. The bay can be entered in deep water between Rt Zaglav Veli and Hrid Gredica, or by the channel adjacent on each side of Otocic Trstenik, the northwesternmost islet. At the head of the bay are three small coves; the center one has some small jetties of loose stone for fishing craft. Large vessels can ANCHOR anywhere between the four islets and the coast in about 7 to 33 fathoms over sand. An isolated 6-fathom rocky patch lies about midway between Otocic Trstenik and Rt Zaglav Veli.

The southwestern end of Ostrvo Korcula terminates at Rt Velo Dance, 1 1/2 miles northwestward of Rt Kljuc.

OSTRVO VIS

10A-19 GENERAL DESCRIPTION.—Ostrvo Vis lies with Rt Stoncica, its northeastern extremity, 16 miles west-northwestward of Rt Proizd (sec. 10A-17). From a distance the island appears as a compact mountainous mass. It is 9 miles long and has an average width of about 4 miles. Three mountain ranges with fertile valleys between traverse its length eastward from the western side where the summit, 1,920 feet high, is situated at its southwestern part. The coasts are high and steep-to except along the southeastern coast, where numerous islets, rocks, and reefs front the shore for a distance of 1 mile in places.

RT STONCICA (43° 04' N., 16° 15' E.), the northeastern extremity of the island, is bare, rocky, and slopes gently to the sea. It is marked by a LIGHT.

Off-lying the southeastern shore for a distance of about 1 mile between Rt Stoncica and Rt Polivalo, about 4 miles southward, is a chain of islets, rocks, and reefs which should be avoided without local knowledge.

LUKA RUKAVAC, entered between Rt Polivalo and Otocic Ravnik, the southwesternmost of the islets just mentioned, provides anchorage in 11 fathoms over good holding ground.

Between Rt Polivalo and Rt Stupisce, 6 1/2 miles westward, the southwestern coast of Ostrvo Vis is rocky and steep-to. Bili Rat, a small bare, light-colored point, 2 miles eastward of Rt Stupisce, is conspicuous as is a sheer red cliff close westward. Rt Stupisce is marked by a light.

ZALIV KOMIZA indents the western coast of Ostrvo Vis for about 1 1/4 miles and is entered between Rt Stupisce and Krizni Rat, about 2 miles northward. The northern and southern shores are steep-to with the exception of a sunken rock about 400 yards northward of Rt Stupisce and close offshore. The bay is closely backed by the mountain range previously mentioned. Depths in the bay are 8 to 46 fathoms.

LUKA KOMIZA, an artificial harbor situated at the northeastern part of Zaliv Komiza, consists of a breakwater about 650 feet long that extends west-northwestward from the shore. The seaward side of the breakwater has a high protective wall; depths of 10 to 16 feet are available along the inner side.

A LIGHT is shown from the head of the breakwater.

ANCHORAGE.—Anchorage can be taken 550 yards westward or 930 yards southward of the head of the breakwater, in 16 fathoms.

10A-20 Rt Barjaci ($43^{\circ}03' N.$, $16^{\circ}03' E.$), the northwestern extremity of Ostrvo Vis, 1 mile northwestward of Križni Rat, is closely fronted by Otočić Barjak Veli and about 400 yards farther westward by Otočić Barjak Mali. These islets may be rounded safely 150 yards seaward. Otočić Barjak Mali is marked by a light. Two isolated rocky patches lie northwestward of Rt Barjaci; one with a depth of 5 fathoms, distant 1 mile, and the other with a depth of $5\frac{1}{2}$ fathoms, distant about $1\frac{1}{2}$ miles.

The northern side of Ostrvo Vis between Rt Barjaci and Rt Nova Pošta, $6\frac{1}{4}$ miles east-northeastward, is bold, steep-to, and indented with a few coves. The eastern part of this stretch is a precipitous reddish cliff.

Hrid Kamik, a low rock joined closely to the shore by a shallow reef, lies $3\frac{1}{4}$ miles east-northeastward of Rt Barjaci.

Uvala Oključna, to westward of a short peninsula, and an indentation, to eastward, are two bays situated between Hrid Kamik and a point nearly 1 mile eastward. These bays provide shelter for medium size to small vessels.

Hridi Volići are two rocks about 600 and 900 yards, respectively, northeastward of Rt Nova Pošta; the outer and larger one, marked by a light, is 10 feet high, and a reef extends about 100 yards southward from it; the inner is 3 feet high, and a rock with a depth of 17 feet over it, lies about 100 yards south-southwestward of it. A rock with a depth of 13 feet over it lies about 200 yards offshore and about 200 yards southwestward of the 17-foot rock mentioned above, with depths of over 9 fathoms between. The rocks are difficult to see in poor light and in bad weather the seas break over them.

A bearing of 110° or greater on Rt Stončica Lighthouse clears Hridi Volići. The lighthouse is obscured southward of this bearing.

Luka Rogačić.—Hrid Rogačić lies close offshore of a point 350 yards south-south-eastward of Rt Nova Pošta. Luka Rogačić

is entered between this rock and Rt od Kampa, about $\frac{1}{2}$ mile east-southeastward. There are four inlets in the bay, the outer two being completely exposed. Small vessels may anchor in about 9 fathoms over gravel in the eastern part of the bay.

10A-21 Viška Luka, a bay about $1\frac{1}{4}$ miles long with an average width of about 800 yards, backed on all sides by high hills whose slopes are cultivated, is entered between Rt od Kampa and a point, about 600 yards north-northeastward of the ruins of the fort of Velington, nearly 1 mile eastward. There is a depth of 30 fathoms in the entrance which decreases gradually to 8 fathoms about 200 yards offshore of the head of the bay. A peninsula, about 200 yards long and on which are some conspicuous ruins, juts from the southeastern shore about midway between the eastern entrance point and the head of the bay. Poluotočić Prirovo, another peninsula on which stands a church, projects about 300 yards southward from the northwestern shore near the head of the bay. Uvala Stonca indents the northwestern shore close northward of Poluotočić Prirovo.

Otočić Host ($43^{\circ}05' N.$, $16^{\circ}12' E.$), 69 feet high, and bordered closely by shallow water on its northeastern and southwestern ends, is separated from Rt od Kampa by a passage about 100 yards wide, in the fairway of which is a depth of 6 fathoms. The islet is mostly bare, has a lighthouse on its northeastern end, and a small mole on its southwestern end.

Hrid Krava (Kravica), 9 feet high, and bordered closely by a reef, consists of several dark jagged rocks situated about $\frac{5}{8}$ mile east-northeastward of Otočić Host.

A light is shown on Hrid Krava.

Otočić Host and the southern end of Poluotočić Prirovo are each marked by a light.

Anchorage.—Vessels anchor, in 11 to 16 fathoms, in the middle or southern part of Viska Luka.

10A-22 The town of Vis stands on the shore at the southwestern part of the head of the bay, and the village of Kut lies on the southeastern side. Quays for small craft are found at both towns.

10A-23 Between Velington and Rt Stončica, about $1\frac{1}{2}$ miles eastward, the northern side of Ostrvo Vis is bold, steep-to, and indented by several coves, Uvala Stončica being just westward of the latter point and eastward of Rt Stračine.

OSTRVO BIŠEVO AND BIŠEVSKI KANAL

10A-24 Ostrvo Biševo lies with its northern extremity, Rt Parnikoza ($43^{\circ}00' N.$, $16^{\circ}00' E.$), $2\frac{3}{4}$ miles west-southwestward of Rt Stupišće, the southwestern extremity of Ostrvo Vis. The island which is hilly and rises abruptly is about 2 miles long and 1 mile wide. Its summit, 787 feet high, is situated at the southern end. The coast is indented and steep, except on the western side where it slopes gradually. The depths surrounding the island are everywhere considerable, and though there are a few above-water rocks close inshore, there are no off-lying dangers except Hrid Galijola, situated 300 yards off the southwestern shore.

Biševski Kanal, between Ostrvi Vis and Biševo, has a minimum width of $2\frac{1}{2}$ miles and is deep and free of dangers. The normal northwesterly current when accelerated by southerly winds can reach a velocity of 2 knots. This channel is the shortest route between the ports on the eastern side of the

head of the Adriatic and the southeastern end of that sea, and by day in fine weather is used with advantage. By night with strong northeasterly or southwesterly winds, and especially in winter, Viški Kanal (10A-29), is to be preferred.

MID-ADRIATIC ISLETS AND DANGERS

10A-25 Ostrvo Svetac ($43^{\circ}03' N.$, $15^{\circ}45' E.$) is situated with its northeastern point about 12 miles westward of Rt Barjaci, the northwestern extremity of Ostrvo Vis. The island is 2 miles long, $\frac{3}{4}$ mile wide, and rises to a summit, 1,020 feet high, at its middle. Its coast is rocky and the northwestern side reddish in color. A few above-water rocks lie close off the southern point, and a sunken rock lies close off Rt Križica, its southwestern extremity; elsewhere the shores are steep-to. Fishing craft shelter to leeward of Rt Križica or behind a small rubble breakwater in Uvala Slatina, a small indentation on the southeastern shore.

Hrid Kamik, dark and jagged, lies about $\frac{1}{2}$ mile westward of Rt Križica.

Otočić Brusnik, 39 feet high, dark and surrounded by rocks, lies $1\frac{3}{4}$ miles southeastward of Ostrvo Svetac. An isolated rocky patch with a depth of $3\frac{3}{4}$ fathoms lies about 400 yards northward of Otočić Brusnik.

Otočić Jabuka ($43^{\circ}06' N.$, $15^{\circ}28' E.$) is a barren, reddish-colored, steep-to rock, 314 feet high, situated $12\frac{1}{2}$ miles west-northwestward of Ostrvo Svetac. Its southeastern side is sheer, and when viewed from southwestward or northeastward, it resem-

bles a sail. *Pličina Jabuka*, an isolated rocky patch with a depth of $3\frac{1}{2}$ fathoms, lies $1\frac{1}{4}$ miles west-northwestward.

Being in the center of the Adriatic, this islet is an excellent point of departure for vessels bound from the Italian coast to the vicinity of Rt Ploča or the channels leading to Split and Zadar; also for those navigating at a distance from the shore.

Caution.—An explosives dumping ground lies with its center about $2\frac{1}{4}$ miles north-northwestward of Otocić Jabuka. It has a radius of $2\frac{1}{4}$ miles.

OSTRVO HVAR

10A-26 General description. — Ostrvo Hvar is one of the largest and most populous of the islands of Yugoslavia. It lies with its eastern point, Rt Sućuraj, 4 miles westward of Rt Podkapeć, on the mainland coast, from which it is separated by Hvarski Kanal. The island is 37 miles long in an east-west direction; its slender eastern part is about $2\frac{1}{2}$ miles wide; thence, westward, it broadens to a width of about 6 miles, forking into two peninsulas, one and the larger to westward, and the other to northwestward.

The island is traversed on its southern side by a range of mountains from the western end for more than two-thirds of its length, which on the southern side descend abruptly to the sea, and northward slope gradually. Vrh Sveti Nikola, 2,053 feet high, located in the western part of the island near the southern shore, is the highest summit. The higher parts of the mountains are bare but the lower slopes are wooded. The valley lying between Starigrad and Vrboska, at the root of the northwestern peninsula, is fertile and cultivated.

Its northern coast, which at the western end is much indented, forms the southern side of Hvarski Kanal. Its southern coast, which is straight, forms the northern side of Korčulanski Kanal. The eastern 9 miles of the southern coast forms the northern shore of Neretvanski Kanal.

Pakleni Otoci are a group of islets, fronted by rocks and reefs, off-lying the southwestern end of Ostrvo Hvar and separated from it by Paleni Kanal. Otočić Vodnjak Veli (43° -

$10' N.$, $16^{\circ}19' E.$), the westernmost of the chain, lies about $2\frac{3}{4}$ miles southwestward of Rt Pelegrin, the western extremity of Ostrvo Hvar. Its southwestern extremity is marked by a light. From Otočić Vodnjak Veli, the chain extends eastward for about $5\frac{1}{4}$ miles to Otočić Jerolim, which lies about 600 yards southwestward of Križni Rat, $3\frac{1}{4}$ miles southeastward of Rt Pelegrin. A light is shown on the eastern side of Otočić Jerolim. Ostrvo Sveti Klement, the central and largest island of the chain, is profusely indented with coves suitable for sheltering small vessels with local knowledge. There are no hidden dangers beyond 800 yards offshore of any islet or above-water rock. The crests of nearly all the islets are overgrown with dark scrubs; their shores are rocky and light-colored.

Luka Soline is the central indentation on the southern shore of Ostrvo Sveti Klement, partially protected south-southwestward by Otočić Dobri. There is an anchorage berth, about 400 yards in diameter, in 8 to 19 fathoms over sand northeastward of Otočić Dobri.

10A-27 Pakleni Kanal lies between the southwestern part of Ostrvo Hvar and Pakleni Otoci, and is entered from westward between Otočić Vodnjak Veli and Rt Pelegrin ($43^{\circ}12' N.$, $16^{\circ}22' E.$), the western extremity of Ostrvo Hvar, about $2\frac{3}{4}$ miles northeastward. The channel narrows towards its eastern end, and between Otočić Jerolim and Križni Rat, on the coast of Ostrvo Hvar, northeastward, is only about 600 yards wide. The depths in the fairway vary from 40 fathoms in the western entrance to 8 fathoms in the eastern entrance, except for a detached 4-fathom patch, 400 yards eastward of Otočić Jerolim.

Pakleni Otoci form the southern side of the channel and are free of dangers 250 yards northward of any islet or above-water rock.

On the northern side of the channel, Rt Pelegrin is steep-to, covered with dark growth, and is the western termination of a hill, 492 feet high, located $\frac{3}{4}$ mile east-southeastward of the point. Between Rt Pelegrin and Luka Hvar, about $3\frac{1}{2}$ miles east-southeastward, the coast rises in steep slopes and

contains several coves suitable for sheltering small vessels.

A 600-foot radio mast, conspicuous and painted in red and white bands, is located about $2\frac{1}{2}$ miles east-southeastward of Rt Pelegrin. A 750-foot radio mast stands about 2 miles east-southeastward of Rt Pelegrin.

Otočić Gališnik, 59 feet high with a fort on it, lies in the approach to Luka Hvar, about 200 yards west-northwestward of Križni Rat, to which it is connected by a shoal with depths of less than 5 fathoms. Depths of less than 4 fathoms extend about 200 yards westward from the islet.

Otočić Pokonji Dol, 36 feet high, lies in the eastern entrance to Pakleni Kanal, about $\frac{3}{4}$ mile east-southeastward of Otočić Jerolim, and 600 yards offshore of Ostrvo Hvar.

Lights.—Rt Pelegrin, the southwestern side of Otočić Gališnik, and the summit of Otočić Pokonji Dol are each marked by a light.

Anchorage in Pakleni Kanal.—There is anchorage for small vessels in the three coves on the northern side of the channel westward of Luka Hvar and, in necessity, under the lee of Pakleni Otoci.

There is anchorage for small vessels in the three coves on the northern side of the channel westward of Luka Hvar and, in necessity, under the lee of Pakleni Otoci.

Anchorage is prohibited on a line between a bay a little over one mile westward of Luka Hvar and a bay which indents Ostrvo Sveti Klement southwestward of the above bay.

10A-28 Luka Hvar ($43^{\circ}10'N.$, $16^{\circ}27'E.$), situated near the eastern end of Pakleni Kanal, is the only harbor of consequence on the southern shore of Ostrvo Hvar, and is a popular summer resort. It is entered between Križni Rat and Rt Fabrika, 700 yards north-northwestward. The harbor is open southward, but is somewhat sheltered in that direction by Otočić Gališnik.

The town of Hvar, population about 2,000 lies on the northeastern side of the inner

harbor. Conspicuous are: Sveti Marko church with a tall tower, situated near the northwestern part of the inner harbor; a shorter tower on a hill at Sviječnice, about 300 yards northward; and the massive ruins of a fort above the town at Španjol, close eastward of the latter.

The inner harbor consists of an inlet extending northward, quayed on all sides, and with a protected boat basin at its northeastern corner. The eastern quay, 623 feet long, is used by medium size vessels, along the southern part of which are depths of 11 to 20 feet. Small vessels anchor in the center of the harbor in about 20 feet of water and secure their sterns to the western quay. A light is shown from the southern corner of the eastern quay; a light is shown $1\frac{1}{4}$ miles northwestward of the latter light. Fresh provisions and water can be obtained. There is regular sea communication with Gruž, Split and Trieste.

Anchorage, in 11 to 19 fathoms, can be taken northward and northwestward of Otočić Gališnik.

Directions for Pakleni Kanal and Luka Hvar.—A vessel approaching Pakleni Kanal from westward will sight Rt Pelegrin, resembling a dark tree-covered hill, from a considerable distance. Shortly thereafter Pakleni Otoci will be distinguished, opening southward and westward of the cape, and when abreast the point, the fort on Križni Rat, a convent close northward, and two towers on Rt Fabrika will be visible before the town of Hvar is sighted. Rt Pelegrin and the southern coast of Ostrvo Hvar should be favored.

A vessel coming from eastward should pass midway between Otočić Pokonji Dol and the coast of Ostrvo Hvar, maintaining the same distance off Hvar until abeam of Otočić Jerolim, avoiding, thereby, the 4-fathom patch eastward of Otočić Jerolim.

A vessel from southward, wishing to avoid the before mentioned patch, should bring Sveti Marko church tower in range with the tower at Sviječnice, bearing 356° , until the northern extremity of Otočić Jerolim is

abeam to westward, whence, course may be shaped northwestward for the channel.

Vessels should not close Otočić Gališnik to westward closer than 200 yards. Steam vessels departing Luka Hvar must not pass through the channel eastward of Otočić Gališnik.

VIŠKI KANAL

10A-29 Viški Kanal separates Ostrvo Vis and Pakleni Otoci. The channel is $6\frac{1}{4}$ miles wide in its narrowest part between Rt Stončica and Otočić Vodnjak Veli and is free of dangers. With the exception of an isolated $5\frac{1}{2}$ -fathom patch, $5\frac{1}{2}$ miles southeastward of Rt Stončica, the channel has depths of 40 to 50 fathoms.

By night, lights shown from the following named positions are visible and serve as navigation aids: Rt Stončica (sec. 10A-19). Rt Pelegrin (sec. 10A-27), Otočić Pokonji Dol (sec. 10A-27), and Ostrvo Sušac (sec. 10A-15).

By day, the summit at the southwestern part of Ostrvo Vis can be seen 40 miles in clear weather, but is often obscured by clouds.

For the prognostication and characteristics of the bora in Viški Kanal, see paragraph on the general winds in this vicinity (sec. 10A-5).

The normal current sets to the northwest at a velocity of about 0.5 knot, increasing with southerly winds.

KORČULANSKI KANAL

10A-30 General description.—Korčulanski Kanal lies between Ostrvo Hvar, on its northern side, and the western part of Ostrvo Korčula, on its southern side. It joins Viški Kanal to westward, with Neretvanski Kanal (sec. 10A-37), to northeastward, and Pelješki Kanal (sec. 10A-31), to southeastward. Pakleni Kanal is entered from eastward from the northwestern part of Korčulanski Kanal. Ostrvo Šćedro with Hridi Lukavci, westward of it, lie on the northern side of the channel, separated from Ostrvo Hvar by šćedarski Kanal. Otočić Pločica lies on the southern side of mid-channel farther southeastward. The depths in the

fairways of the contained channels which are free of dangers are from 23 to 46 fathoms.

The principal landmarks visible from afar are the summits of: Sveti Nikola, 2,053 feet high, located in the western part of Ostrvo Hvar; the mountain, 1,673 feet high, close southward of Zaliv Vela Luka at the western end of Ostrvo Korčula; and Vipera, 3,153 feet high, on Poluotok Pelješac.

The bora blows strongly from Neretvanski Kanal. The scirocco also blows with force and may increase the velocity of the normal westerly current to 3 knots.

Vessels may pass, with caution on either side of Ostrvo Šćedro and Otočić Pločica, the selection depending on destination. Small vessels usually hug the northern side of the channel, especially when anticipating strong winds, so as to be able to anchor, if necessary, in Luka Lovišće on the northern side of Ostrvo Šćedro.

On the northern side of Korčulanski Kanal, the southern coast of Ostrvo Hvar from abreast of Otočić Pokonji Dol to the western entrance point of Uvala Smrska, about 23 miles eastward, is steep-to and backed by high land.

Ostrvo Šćedro lies with Rt Donji, its western point, 10 miles east-southeastward of Otočić Pokonji Dol, and 2 miles offshore of Ostrvo Hvar. A light is shown on Rt Donji. The island, $3\frac{1}{2}$ miles long, slopes gently seaward from an elevation at each end, that on the western end being 370 feet high. The island is much indented and is steep-to except for shallow water with depths of less than 5 fathoms fronting the eastern and northwestern extremities for a distance of about 200 yards. Uvala Lovišće on the northern side of Otočić Šćedro, is an inlet with an entrance about 165 yards wide and with depths of $5\frac{1}{2}$ to 16 fathoms in its middle. Small vessels can find sheltered anchorage off the four coves of the inlet. A light is shown on the eastern side of the entrance to Uvala Lovišće.

Hridi Lukavci are two bare, light-colored rocks situated about $3\frac{1}{2}$ miles westward of Rt Donji. The two rocks lie on a shallow

reef which extends about $\frac{1}{2}$ mile eastward of the northwestern rock; a detached rocky patch lies 800 yards northwestward of the same rock. The current sets strongly near these rocks during easterly winds.

A light is shown on the southeastern rock.

The eastern entrance point of Uvala Lovišće and a position 700 yards southeastward of Rt Donji are each marked by a light.

On the southern side of Korčulanski Kanal, the northern coast of Ostrvo Korčula from its western extremity to the western entrance point of Luka Račišće, about 18 miles eastward, is hilly, covered with trees, and sparsely inhabited. The coast is bold with several coves. There are no hidden dangers except a rock with a depth of 6 feet lying close off Rt Prihodišće, $12\frac{1}{2}$ miles eastward of Rt Proizd. Several above-water rocks lie close off this coast and all may be passed safely at a distance of 100 yards to northward. Hridi Naplovci are light colored and lie eastward of the entrance to Uvala Prigradica. East-southeastward of these reefs and close to the shore, lies Hridi Blaca. This reef is covered with bushes and is marked by a stone cross.

Uvala Prigradica, situated about 3 miles westward of Rt Prihodišće, is an inlet entered between a point to westward, on which there is a conspicuous tower, and the head of a partially destroyed breakwater extending from the eastern entrance point, providing a passage 130 yards wide in which there are depths of 9 to 13 fathoms. A light is shown from the head of the breakwater. The southern side of the inlet is quayed with along-side depths of about 10 feet; there is a boat basin at the head of the inlet. This harbor is the port for the town of Blato, $1\frac{3}{4}$ miles south-southwestward. The bay provides good anchorage with protection from all winds except the bora. During a bora, the bay is considered dangerous.

Otočić Pločja, about 600 yards long, lies about 4 miles northward of Uvala Prigradica. Its northwestern end rises to a height of 43 feet; during high tide the southeastern extremity of the islet is separated by water from the rest of the islet. This must be taken into consideration so as not to confuse this

extremity with a rock which usually breaks about 400 yards farther southeastward. These islets should not be approached closely. A light is shown from the summit of Otočić Pločja.

PELJEŠKI KANAL

10A-31 General description. — Pelješki Kanal lies between the southwestern side of Poluotok Pelješac and the northeastern side of Ostrvo Korčula. It connects Korčulanski Kanal, to westward, with the junction of Lastovski Kanal and Mljetski Kanal, to eastward. It is a little over $\frac{1}{2}$ mile wide at its narrowest part, and the depths in the usual route taken by larger ships are 10 to 37 fathoms. Several islets surrounded by rocks and reefs lie a short distance within the southeastern entrance.

The channel, which is about 13 miles long, is entered from southeastward between Hrid Dingački Školj and Rt Ražnjić, the eastern extremity of Ostrvo Korčula, about 7 miles westward. From westward the channel is entered between Rt Osječ, the southwestern extremity of Poluotok Pelješac, and the western entrance point of Luka Račišće, 2 miles southward.

The bora blows strongly in Pelješki Kanal and with violent squalls in the eastern part. The scirocco and northwesterly winds blow fresh through the channel producing rough seas.

During calms and light breezes the current is chiefly tidal and varies from 0.5 to 1.5 knots. With winds of long duration this velocity may reach 3 knots in direction with the wind. At times during the summer an easterly current has been observed off the town of Korčula.

Submarine cables extend north-northwestward from the town of Korčula and a point about $\frac{1}{2}$ mile westward, to Poluotok Pelješac.

Regulation.—In order to protect small craft moored in the canal, vessels are limited to a speed of 12 knots between Rt Kneza on the west and the meridian of $17^{\circ}12'$ E. on the east.

10A-32 The western extremity of Poluotok Pelješac divides Korčulanski Kanal, at its eastern end, into Neretvanski Kanal, to northward, and Pelješki Kanal, to south-

ward. The western face of Poluotok Pelješac between Rt Lovišće, its northwestern point, and Rt Osićac, $2\frac{1}{4}$ miles southward, its southwestern point, is deeply indented. In Uvala Luka, the middle and largest indentation, there is an anchorage about 300 yards in diameter in 5 to 9 fathoms over good holding mud and sand. To avoid two shoals with a depth of about 19 feet off the entrance, vessels entering Uvala Luka should approach Rt Ključ, the northern entrance point between the bearings of 055° and 085° until about 700 yards therefrom, whence, a mid-channel course should be followed toward the northern cove. A light is shown on Rt Ključ.

Rt Lovišće ($43^\circ 03' N.$, $17^\circ 00' E.$) is the extremity of a hilly tongue of land with gentle slopes covered thickly with bushes. Shallow water borders the point northward and northwestward for about 400 yards.

Rt Osićac is a narrow rocky projection, 95 feet high, connected to the mainland by low land, which from a distance causes it to appear as an island.

Rt Lovišće and Rt Osićac are each marked by a light.

10A-33 On the northeastern side of the southeastern entrance to Pelješki Kanal, between Hrid Dingački Školj and Zaliv Trstenica, about 8 miles northwestward, the coast is steep-to with the exception of a few narrowly bordering shoals.

From Zaliv Trstenica, a slight bight about $1\frac{3}{4}$ miles wide, the northern shore of the channel trends about $5\frac{1}{2}$ miles westward to Rt Sveti Ivan, thence 3 miles west-northwestward to Rt Osićac. This stretch of shore is indented slightly with two bights and is fronted by shallow water with depths of less than 6 fathoms for a maximum distance of 400 yards off Orebić, situated on the western entrance point of Zaliv Trstenica.

Between Orebeć and Rt Zamošće, about 2 miles westward, the shore is backed about 400 yards inland by a range of rocky heights,

328 to 492 feet high. Velika Gospa, on about the middle of the range, and Sveta Ana Chapel, farther westward, are the best navigational marks in the channel.

Rt Sveti Ivan is steep, and the land rises to a height of 931 feet about 700 yards north-eastward. There is a conspicuous chapel over the point at an elevation of 164 feet.

10A-34 On the southwestern side of the southeastern entrance to the channel between Rt Rašnjić and Poluotočić Korčula on which stands part of the town of Korčula, 4 miles northwestward, the coast is indented with several coves and is fronted with numerous islets surrounded by rocks and reefs. Rt Rašnjić is a bare tongue of land, 13 feet high, which projects a short distance eastward from a hill, 269 feet high. On the point is a stone pile surmounted by a cross. A light is shown on the point.

The islets farthest off-lying the southwestern shore are Otočići Sestrice, two low, brush-covered islets, Sestrica Vela, to northwestward, and Sestrica Mala, to southeastward, both closely joined by a shallow reef. The other islets and dangers are almost completely enclosed southward of a line joining Otočići Sestrice and Poluotočić Korčula, and westward of a line joining the same islets and Rt Rašnjić. Large vessels ordinarily use the channel eastward and northward of Otočići Sestrice and vessels with local knowledge use a shorter passage southwestward which also has deep water but is more constricted. The summit of Otočić Sestrica Vela, the northwestern islet, is marked by a light. Otocić Stupe Velika, an islet about one mile westward of Otocić Sestrica Vela, is marked by a light on its western point.

Uvala Tatinja, situated $1\frac{1}{4}$ miles west-northwestward of Rt Rašnjić, is a small cove protected by a breakwater, 155 feet long, on the inner side of which small craft can secure. The head of the breakwater is marked by a light.

Uvala Luka, an inlet with an anchorage and a short quay for small craft, is entered between Poluotočić Korčula and Rt Križ, $\frac{1}{2}$ mile southeastward.

Kanal Ježevica lies between the shore of Ostrvo Korčula southward of Rt Križ and the off-lying islets. It can be entered from southward by vessels with local knowledge and with a draft not exceeding 24 feet; there is a sheltered anchorage, about 400 yards in diameter, in 7 to 12 fathoms, southwestward of the monastery on Otočić Badija, the islet lying close westward of Rt Križ.

From Poluotočić Korčula, the southern shore of the channel trends $4\frac{1}{4}$ miles west-northwestward, whence, a peninsula, 164 feet high, juts $\frac{1}{4}$ mile east-northeastward to form Rt Kneža. The intervening shore is indented with a number of coves suitable for sheltering small craft only. Pličina Vrbovica, with a depth of less than 6 feet, lies about $1\frac{1}{2}$ miles westward of Poluotočić Korčula and about 250 yards offshore; it is marked by a white stone beacon. With the exception of this reef, deep water lies 150 yards offshore of any point along this stretch of shore. Otočić Kneža Vela, 75 feet high and thickly covered with bushes lies close westward of Rt Kneža to which it is joined by a shallow spit. The northeastern extremity of the islet is marked by a light.

Between Rt Kneža and Luka Račišće, $1\frac{1}{4}$ miles westward, the coast is high and steep-to.

10A-35 Ports in Pelješački Kanal—Luka Orebeć.—The conspicuous village of Orebeć stands on the shore of the western entrance point of Zaliv Trstenica. The harbor consists of a breakwater, 518 feet long, extending southwestward from the western end of the village. The northwestern side of the breakwater is quayed, and alongside the outer 190 feet, which is widened, there are depths of 11 to 15 feet. The head of the breakwater is marked by a light. Large vessels anchor, in 9 to 12 fathoms, in front of the village in fair weather only as the holding ground is poor in the vicinity. The use of this anchorage all night is prohibited.

Sidrište Kučišće is a bight formed between Rt Zamošće and Rt Rat, about 1 mile westward, on the northern side of the channel. The village of Kučišće is located at the north-

western side of the bight where there are several short moles; the largest is 167 feet long and has alongside depths of 6 to 11 feet. The head of the mole is marked by a light.

Luka Korčula ($42^{\circ}58' N.$, $17^{\circ}08' E.$), on the southern side of Pelješki Kanal, is entered between Poluotočić Korčula, a small peninsula compactly occupied by the town of Korčula, population about 2,000, and a point about $\frac{1}{4}$ mile westward. Conspicuous are: an old tower on a 272-foot hill, $\frac{1}{4}$ mile southwestward of the town; the high church tower in the middle of the town; and Sveti Nikola Monastery on the western entrance point.

A short breakwater extends northward from the town, southwestward from the root of which extends a quay 570 feet long, with alongside depths of 11 to 15 feet. A shorter quayed section for small craft extends southward from the former. Lučica Korčula, on the southeastern side of the town, has a short quay for small craft opposite the powerhouse. Close southward there is a 650-foot concrete quay alongside a sawmill and other buildings.

The head of the breakwater is marked by a light. A light is shown from a position about 400 yards southward of the head of the breakwater.

Small vessels can go alongside the quay, where there are depths of 13 feet. Large vessels anchor outside the harbor in about 22 fathoms. Submarine cables extend north-northwestward from the town of Korčula and a point about $\frac{1}{2}$ mile westward, to Poluotok Peljesac.

Luka Račišće, on the southern side of the channel, lies $1\frac{1}{4}$ miles westward of Rt Kneža and has an entrance about 400 yards wide. A breakwater, quayed on its inner side, projects 197 feet from the village of Račišće, population about 1,000, situated on the southwestern side of the inlet. Small craft can secure alongside the breakwater; small vessels secure their sterns to the breakwater and with bow hawsers to the quay southeastward. The head of the breakwater is marked by a light.

Anchorage in Pelješki Kanal. — Besides those previously described, the channel affords good anchorage throughout for vessels

of any size, about $\frac{1}{2}$ mile offshore in 18 to 24 fathoms over sand, care being taken to avoid the submarine cable running northward from Poluotočić Korčula.

Sidrište Kučišće provides good anchorage for large vessels in about the center of the bight in 16 to 22 fathoms and about 300 yards offshore.

Sidrište Viganj, situated about 1 mile westward of Sidrište Kučišće, affords good anchorage for large vessels in 11 to 15 fathoms over mud, southwestward of the church in the village of Viganj, on the northeastern shore of the bight, and about 400 yards offshore.

10A-36 Directions for Pelješki Kanal.

Vessels navigating the channel may not proceed at a greater speed than 12 knots, between a line joining Rt Kneža and Rt Sevti Ivan on the west, and the meridian of $17^{\circ}12'$ E., on the east.

A vessel entering the channel from eastward should favor the shore of Poluotok Pelješac and steer a course to pass eastward and northward of the islets in the entrance. Sveti Nikola Monastery in range with the light structure on the head of the breakwater at Luka Korčula, bearing 264° , leads northward of the islets in the entrance.

When making the passage from westward, Vrh Vipera, the summit of Poluotok Pelješac, 3,153 feet high, standing about 7 miles eastward of Rt Osičac, is a conspicuous landmark. The approach between Rt Osičac, on the northern side, and Luka Račišće, on the southern side, is clear of dangers, and readily identified. Rt Sveti Ivan, high and with a conspicuous chapel, will be sighted on closer approach, and Rt Kneža, which is wooded and of moderate height, southward, with Otočić Kneža Vela closely off-lying it. Between these points the channel is deep and clear of dangers.

NERETVANSKI KANAL

10A-37 General Description.—Neretvanski Kanal is a continuation eastward of the

northern part of Korčulanski Kanal and is entered between Rt Lovište, on its southern side, and the southeastern shore of Ostrvo Hvar, on its northern side. Off Rt Sućuraj, the eastern extremity of Ostrvo Hvar, Hvarski Kanal enters Neretvanski Kanal from northwestward, whence, the latter extends southeastward between Poluotok Pelješac and the mainland to Rt Blaca, about 19 miles southeastward, where it joins Kanal Stona Malog. Rijeka Neretva enters Neretvanski Kanal at a position about 12 miles southeastward of Rt Sućuraj.

The channel is clear of dangers at a distance of 400 yards offshore except at its southeastern end and at the mouth of Rijeka Neretva.

The bora blows violently down the slopes of the coastal mountains and through the valley of the Neretva and is felt in all the channel but particularly along the northeastern coast of Poluotok Pelješac. The scirocco is also strong and produces a sea troublesome for small vessels. Normally during the morning an easterly wind is encountered from the valley of the Neretva.

A northwesterly current of 1 to 2 knots prevails in the channel with easterly or southeasterly winds, and generally during winter. After heavy rains this current can reach a velocity of 3 knots at the mouth of the Neretva. The ebb tidal current, which is southeasterly, reaches a maximum velocity of 0.5 knots with northwesterly and westerly winds if there has not been heavy rain previously.

It is advisable when proceeding eastward in this channel, especially with northerly or easterly winds, to favor the coasts of Ostrvo Hvar and the mainland where a favorable counter current will usually be met.

10A-38 The northern side of the channel between Uvala Smrska, directly northward of Rt Lovište, and Rt Sućuraj, the eastern extremity of Ostrvo Hvar, about 10 miles

eastward, is indented with coves and is moderately steep-to. A $5\frac{1}{2}$ -fathom patch lies about 2 miles west-southwestward of Rt Sućuraj and close offshore; from abreast this patch to Rt Sućuraj, the coast is narrowly bordered with shallow water with depths of less than 5 fathoms.

Large vessels can find anchorage sheltered from northerly winds under this coast between Uvala Smrska and Uvala Mrtinovik, about $4\frac{1}{2}$ miles eastward, in 18 to 25 fathoms over sand and mud, from 400 to 500 yards offshore. Small vessels can anchor in the coves.

Rt Sućuraj ($43^{\circ}07' N.$, $17^{\circ}12' E.$) is low, narrow and steep-to, and has a lighthouse and a small chapel on it.

Luka Sućuraj, situated about 800 yards westward of Rt Sućuraj, is a small inlet entered from eastward, and used by coasters. A breakwater, quayed on its inner side, protects the harbor from southward. The inner northern side of the harbor is quayed but only the eastern part, about 180 feet long with an alongside depth of about 9 feet, can be used by other than boats. Small vessels can also berth at the outer part of the breakwater provided they are breasted off.

10A-39 On the southern side of Neretvanski Kanal, the shore of Poluotok Pelješac is high, wooded, and with few exceptions, steep-to.

Rt Lovište is described in section 10A-32.

Rt Duba on which there is a chapel, lies $7\frac{1}{2}$ miles east-southeastward of Rt Lovište at the foot of a conspicuous valley leading towards Vrh Vipera, previously mentioned. This point is bordered for about 400 yards by shallow water with depths of less than 5 fathoms. A detached 4-fathom patch lies about 1 mile eastward and 400 yards offshore.

Uvala Duba Gornja lies close eastward of Rt Duba where two breakwaters with an entrance about 108 feet wide form a harbor for

small craft. There is a mole for boats on the southern side of the harbor. About 140 feet of the inner side of the eastern breakwater has alongside depths of 8 to 10 feet.

Uvala Divna with an islet close off its western entrance point is situated about $1\frac{1}{4}$ miles eastward of Rt Duba.

Luka Trpanj is situated about $4\frac{1}{4}$ miles eastward of Rt Duba. A detached 2-fathom patch lies about $\frac{1}{2}$ mile westward of Trpanj and $\frac{1}{4}$ mile offshore. The village of Trpanj is prominent from northwestward but from southeastward is hidden by a ridge on which are two chapels.

The harbor consists of a bay protected to northeastward by a breakwater, about 900 feet long, constructed partly on two rocky ledges. To southwestward a right-angled breakwater extends about 330 feet northward and then 400 feet eastward to form a boat basin. Since both breakwaters are built on rocky ledges surrounded by a reef, they may not be approached closely. A mole with an alongside depth of 10 feet extends about 165 feet northwestward from the quay at the village.

Lights at the western end of Neretvanski Kanal.—The following described positions are each marked by a light: Rt Lovište, Rt Sućuraj, the head of the breakwater at Luka Sućuraj, the head of the mole at Uvala Duba Gornja, the head of the northern breakwater at Luka Trpanj, and the head of the mole at Luka Trpanj.

Between Luka Trpanj and Rt Rat, $8\frac{1}{4}$ miles east-southeastward, the southern shore of Neretvanski Kanal, which is bare in parts, slopes abruptly to the sea and is steep-to. There are several coves, the principal ones being Uvala Crkvice, $5\frac{1}{4}$ miles east-southeastward of Luka Trpanj, and Uvala Osobljava, 1 mile farther east-southeastward. Small craft drawing up to 8 feet can secure to the inner side of the breakwater, about 150 feet long, at Uvala Crkvice.

In the southeastern part of Uvala Osobljava there is a 72-foot quay with a depth alongside of 2.1m (7 ft.).

10A-40 On the northeastern side of Neretvanski Kanal, the mainland coast between Rt Podkapeč, situated 4 miles eastward of Rt Sućuraj, and Rt Višnjica, 8 miles southeastward, is backed by high land with steep slopes, the highest peak being that of Sveti Ilija, 2,526 feet high, situated $4\frac{1}{2}$ miles southeastward of Rt Podkapeč.

Luka Gradac ($43^{\circ}06' N.$, $17^{\circ}21' E.$) is situated on the southern side of a small point, about 3 miles southeastward of Rt Podkapeč, from which a breakwater, about 397 feet long, with three knuckles, extends southeastward. The village of Gradac, population about 1,200, lies on the northeastern side of the harbor. The outer leg of the breakwater can accommodate a vessel 130 feet long, drawing up to about 12 feet. The head of the breakwater is marked by a light. Large vessels can anchor southward of the harbor in 26m (14 fm) to 29m (16 fm).

RIJEKA NERETVA

Position: Entrance, $43^{\circ}01' N.$, $17^{\circ}27' E.$

Depths:

Entrance bar, 3m (10 ft.).

Quay at Komin, 1.8m (6 ft.).

Quay at Opuzen, 3m (10 ft.).

Quays at Metković, 2.4m (8 ft.)
to 4.3m (14 ft.).

10A-41 Rijeka Neretva, one of the largest rivers in Yugoslavia, rises at Brdo Zivanji and after receiving many tributaries in its 250-mile length discharges into Neretvanski Kanal through its delta in a marshy valley between Rt Višnjica (sec. 10A-40), and Rt Osik, $3\frac{1}{2}$ miles southeastward. The principal navigable pass of the river is dyked on each side from its mouth to Metković, 11 miles up stream. An interrupted dyke encloses the delta northward between the main mouth of the river and Luka Kardeljevo (sec. 10A-52), and a similar one southeastward

toward Rt Osik. A low sand spit extends about $\frac{1}{2}$ mile west-southwestward from the head of the southeastern dyke, and a shoal about $\frac{1}{4}$ mile wide with shallow water over it lies on the northern side of the sand spit. The river is entered from westward and to northward of the sand spit and shoal.

10A-42 Current and wind. The river current has a normal velocity of 2 to 2.5 knots, but in the rainy season it may increase to 5 knots, and in exceptional cases to 7 knots.

The bora sweeps violently through the river valley; its greatest force is encountered usually about 7 miles eastward of the mouth. During the good season, a breeze blows out of the valley in the morning and a sea breeze sets in in the afternoon.

10A-43 Depths.—There is a depth of 3m (10 ft.) over the bar at the entrance; vessels which can cross it can ascend the river as far as Metković. Small vessels that can pass under the bridge at Metković can proceed as far as Vido. During the flood season the river rises as much as 1.5m (5 ft.) above normal level.

The depth in meters over the bar is displayed in white figures on a black sign at the head of the southeastern dyke, and a similar sign farther northeastward on this dyke indicates the depths over the shallows in the river. These depths are displayed also at Metković.

10A-44 Landmarks.—The low marshy delta at the foot of the valley of Rijeka Neretva, bounded by higher land rising abruptly, serves to identify the position of the river. Rt Višnjica, to northwestward, is high and bluff, and is the termination of a summit, 800 feet high. Otočić Osinj, to southeastward, closely off-lying Rt Osik, has three conical peaks, the southern one being 249 feet high and showing up well against the land behind it. See section 10A-60.

10A-45 Anchorage.—Vessels can anchor between the mouth of the river and Otočić

Osinj in 12.8m (7 fm) to 26m (14 fm) over mud. A good berth lies in 18.3m (10 fm) to 26m (14 fm) with the head of the south-eastern dyke bearing 304°, distant about 1/2 mile.

10A-46 Navigation aids at entrance.—Rt Višnjica, and the head of both the north-western and the southeastern dykes are each marked by a light.

Pličina Gumanac, situated about midway between the heads of the Rijeka Neretva Dykes and Rt Višnjica, is marked off its southwestern extremity in about 18.3m (10 fm) of water by a light buoy. A strong scirocco may sweep the buoy northward.

The sandspit off the entrance is marked by three wooden posts.

A light buoy and a black conical buoy mark the northern edge of the shoal northward of the sandspit.

Two range beacons are located close to the head of the southeastern dyke and indicate the best approach channel northward of the shoal previously mentioned.

10A-47 Pilotage to Mitrovic is compulsory and pilots board vessels 3 miles off Rt Višnjica. There is day and night service.

10A-48 Directions for entering.—Vessels intending to enter Rijeka Neretva should first make Pličina Gumanac Light Buoy, thence steer to pass close northward of the light buoy marking the northern edge of the sandspit. Then steer to pass between the head of the northwestern dyke and the black conical buoy marking the northeastern edge of the sandspit. When this buoy is abeam, steer for the entrance between the dykes.

The full strength of the outgoing current is encountered between the easternmost buoy marking the sandspit and the head of the northwestern dyke; therefore, the port anchor should be held in readiness on approaching the heads of the dykes in case the current on the port bow prevents the vessel from negotiating the turn, in which circumstance the port anchor should be dropped with a short scope of chain to permit the vessel to head into the current.

See section 1-24 concerning danger areas.

10A-49 Navigation regulations for Rijeka Neretva.—A copy of these regulations should be obtained from the port authorities. The principal regulations follow in abbreviated form:

Vessels must not exceed a speed of 8 knots in the river and must reduce this speed where another ship is berthed and where construction and dredging work is progressing.

Anchoring in the mouth of the river and in positions restricting the navigation of other vessels is prohibited.

At the river's mouth, an outbound vessel will sound one blast on the whistle to indicate her presence to an inbound vessel; the latter must wait outside until the other has cleared the entrance.

Vessels must not pass each other in narrow passages or where other vessels are berthed, the inbound or overtaking vessel reducing speed or stopping.

Vessels proceeding in opposite directions keep to the right when passing.

When one vessel desires to overtake another, she shall signal her intention by sounding five blasts on the whistle. The overtaken vessel must give way, reduce speed, and permit the passing on her starboard side.

10A-50 Rijeka Neretva, between the mouth and Metković.—The depths in this part of the river vary from 3.6m (12 ft.) to 12.8m (42 ft.), and, as mentioned previously, the river rises as much as 1.5m (5 ft.) above normal level during the flood season. The extreme low level (zero on the height gauge) occurs in summer after a drought and with southerly winds, and in winter when the head waters freeze or a bore is prolonged. Vessels with a maximum draft of 11 1/2 feet can proceed to Metkovic. The river is lighted up to Metkovic.

Beside those locations marked, there is shallow water in places extending from both sides of the river, distinguishable by still water.

Pličina Gospa extends from the northern bank of the river about one-third of its width at a position about 2 1/2 miles from the entrance. Its southern extremity is marked by a buoy. Vessels with 11 1/2 foot draft, proceed-

ing against the current, should pass the buoy to port.

The village of Komin lies on the northern side of the river about 4 1/2 miles from the entrance. ANCHORAGE is prohibited above Komin on a line marked by notice boards, on which are painted overturned anchors.

OPUZEN lies on the southern side of the river 1 1/2 miles upstream of Komin. Plicina Opuzen is located eastward of the village at the junction of the main stream and Rijeka Mala Neretva, the northwestern corner of which is marked by a black BUOY, vessels should leave it to starboard. The eastern end of the quay at Opuzen is marked by a LIGHT.

PLICINA SEGET, lying off the southern bank of the river close upstream of Norinska Kula which is situated 2 miles upstream of Opuzen, is marked by a BEACON with ball top mark. At flood water this bank of the river is submerged.

Metkovic, situated 4 1/2 miles upstream of Opuzen, lies on the southern shore of the river with some facilities on the northern shore. A highway bridge crosses the river at the eastern part of the town. The center of the quay on the southern bank of the river is marked by a LIGHT.

The river CURRENT depends upon rainfall and the height of the river, usually up to 2 1/2 knots and to 5 knots after rains.

10A-51 FACILITIES IN RIJEKA NERETVA.—Komin, on the northern side of the river, has a quay about 700 yards long with an alongside depth of about 1.8m (6 ft.), extending a short distance from a long embankment.

Opuzen, on the southern side of the river, has a stone quay, about 328 feet long with an alongside depth of about 3m (10 ft.). There is a railway station on the northern bank of the river.

Metkovic (43°03'N., 17°39'E.).—This town lies on the southern side of the river, with berthing facilities also on the northern side, where there is a station for the railway which connects the town with Mostar, Dubrovnik, Zelenik, Sarajevo, and Beograd toward the interior, and Luka Kardeljvo and intervening river ports, seaward. There is also a motor road to Sarajevo, Split, and Dubrovnik. Metkovic is the principal port for exportation of lumber, coal and iron ore from Bosna and Hercegovina by small vessels.

A masonry quay, about 600 feet long with a depth of 2.4m (8 ft.) alongside, fronts the town on the southern side of the river. The eastern part of this quay is about 10 feet high and all of it has an under-water foundation projecting about 2 feet in places.

On the northern shore there is a concrete quay about 2,700 feet long with alongside depths of 2.4m (8 ft.) to 4.2m (14 ft.). These depths increase to 3.9m (13 ft.) to 4.9m (16 ft.) about 65 feet offshore. Down-stream of this quay are several wooden piers for loading lumber and iron ore.

Domestic coal can be obtained. River water is used for boilers.

Malaria is prevalent.

LUKA PLOCE (KARDELJEVO)

Position: 43°03'N., 17°26'E.
 Depths: Entrance fairway, 9.4m (31 ft.) to 10m (33 ft.)
 Anchorage, 5.5m (3 fm) to 12.8m (7 fm).
 Quays, 4.4m (14 3/4 ft) to 8.5m (28 ft.).
 Port plan: Section 10A-58.

10A-52 LUKA PLOCE is situated in an inlet about 1 1/2 miles long, entered between Rt Visnjica, on its western side, and the delta of Rijeka Neretva, on its eastern side. This land-locked basin is protected southward by land reclaimed from this delta. The entrance channel, about 1,200 yards long, is narrowed by river silts to a navigable width for ocean-going vessels of about 65 yards. The entrance channel leads into the southern part of Uvala Velika Posta, where, on its western side, Oticic Ploca is separated from a point, 100 yards northwestward, by a reef. Uvala Mala Posta is entered from the southeastern part of the larger bay between Zminjac peninsula, on which are located the wharves and port facilities, and Rt Zminjac, about 100 yards northward. At the entrance to a cove on the western side of the entrance channel between a point, 330 yards north-northeastward of Rt Visnjica and Rt Bad, 650 yards farther north-northeastward, there is an inlet closely bordered by a reef.

A CABLE AREA extends south-southwestward to the opposite shore from the vicinity of Rt Visnjica.

Rijeka Stara Neretva, which empties on the eastern side of the entrance to Luka Kar-deljevo, is navigable for craft not exceeding 8 feet draft to Rijeka Crna, and thence to Rastoke, where it enters Rijeka Neretva under a bridge about 2 miles downstream from Komin.

The harbor berths consist of Gat Oslobođenja and Biokovska Oblala are in Uvala Velika Posta, and Titova Obala on the southern side of Uvala Mala Posta.

10A-53 DEPTHS.—The depth in the fairway of the entrance is 9.4m (31 ft.) to 10m (33 ft.); that in the anchorage for a large vessels is 12.8m (7 fm); the depths in the anchorages for small vessels are from 5.5m (3 fm) to 10.9m (6 fm); and the depths alongside the quays vary from 4.4m (14 3/4 ft.) to 8.5m (28 ft.).

10A-54 The LANDMARKS for Luka Kar-deljevo are identical with those for Rijeka Neretva, section 10A-44.

CURRENTS AND WINDS.—The prevailing current in the entrance channel is toward its exit and the channel is hazardous because of cross currents caused by the two rivers flowing into it. Maximum current velocity is 3 knots.

In winter, winds are most frequent from the northward and southward. In summer, winds are most frequent from the northwestward.

10A-55 ANCHORAGE.—Vessels wanting to enter the harbor can anchor in mud and sand at about 1/2 mile offshore, from 1 mile westward of Rt Visnjica to Tanki Rt (about 2 1/4 miles northwestward of Rt Visnjica).

Small vessels anchor south-southwestward of Rt Bad in depths of 7m (23 ft.).

10A-56 NAVIGATION AIDS.—The following described positions are marked by **LIGHTS**: the southern extremity of Rt Visnjica. The eastern side of Rt Visnjica, Rt Bad, and the western end of Gat Oslobođenja.

Plicina Gumanac Light Buoy is described in section 10A-46.

The eastern side of the entrance channel is marked by two **LIGHT BUOYS**, each painted black and showing a flashing green light; one is moored eastward of Rt Visnjica, and the other is moored eastward of Rt Bad.

Caution.—A 2.7m (9 ft.) shoal lies about 100 yards southeastward of Rt Zminjac.

Regulation for ENTERING AND LEAVING THE HARBOR.—1. Vessels approaching from the northwest or west must round Rt Visnjica at a minimum distance of 1 mile. After reaching the line formed by the continuation of the axis of the channel, vessels can enter the channel.

2. Vessels leaving the channel and sailing in a northwesterly or westerly direction, must round Rt Visnjica at a distance of about 1/2 mile.

3. Vessels are prohibited from passing each other in the entrance channel; for this reason the following signals are to be made:

a. The entering vessel must sound a long blast when abreast the southern light buoy on the eastern side of the entrance channel.

b. The leaving vessel sounds 1 long blast when approaching the light on the eastern side of Rt Visnjica.

c. Vessels entering the channel must wait until the leaving vessel is clear of the channel.

Vessels may not proceed northward of a line extending east-northeastward across Uvala Velika Posta from a position about 550 yards northward of Rt Bad without permission of the port authority.

10A-57 PILOTAGE is compulsory for vessels over 500 tons; pilots board vessels at the entrance, day and night.

10A-58 FACILITIES.—Luka Ploče is of commercial importance because of its exports of coal, lumber, silica sand, and bauxite.

The port has about ten cranes of 5-to 10-ton capacity.

Berths.—Gat Oslobodenja, has a length of about 1,345 feet with depths of 23 to 28 feet. The quay has warehouses and is served by railroad.

Titova Obala, along the eastern shore of Uvala Mala Posta about 1/2 mile east-northeastward of the light on Gat Oslobodenja, has about 1,000 feet of berthing space with 14 3/4 to 18 feet alongside.

Biokovska Obala, extending northward and northeastward from the root of Gat Oslobodenja, has about 1,300 feet of berthing space, with a depth of 28 feet alongside its northern and middle part.

Bosonska Obal (under construction 1964) extends about 900 feet southeastward from the northeastern end of Biokovska Obala. Tugs are available.

Supplies.—Provisions are available. Water is piped to all quays.

Deratting.—Deratting Exemption Certificates can be issued.

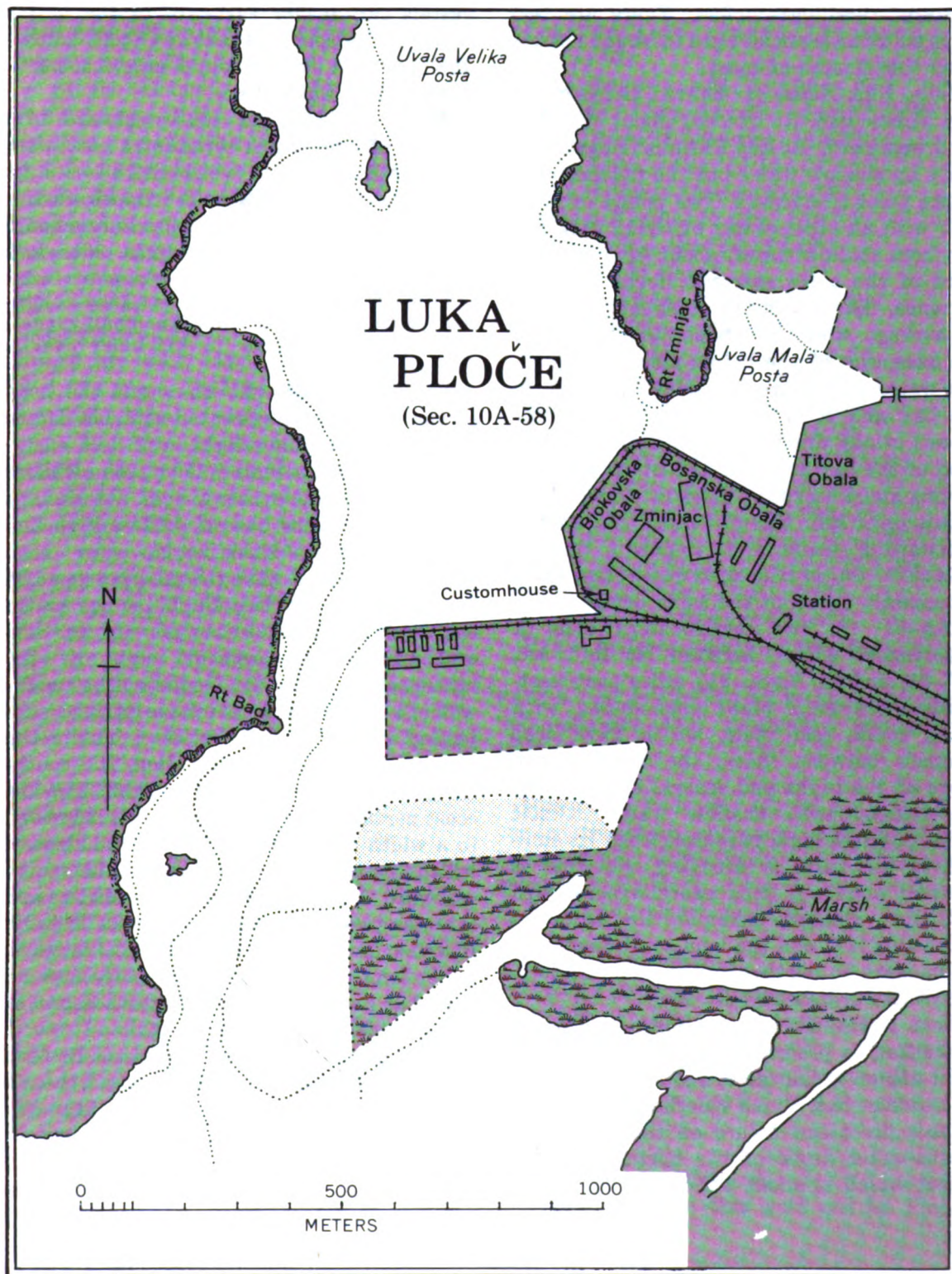
KANAL MALOG STONA

10A-59 General description.—Kanal Malog Stona is a continuation southeastward of Neretvanski Kanal between Poluotok Pelješac and the mainland coast. The channel proper is entered between Rt Blaca (42°55' N., 17°31' E.), 3½ miles east-southeastward

of Rt Rat (sec. 10A-39), and Rt Rep Kleka, 1½ miles east-northeastward. It is about 10½ miles long to the head of Uvala Kuta, at the northwestern part of which is situated Luka Mali Ston. For a distance of 5½ miles from the entrance, the channel is deep and clear of dangers, but southeastward and for a distance of about 1 mile in Tesnac Malog Stona, it narrows and shoals so that only vessels with local knowledge and a draft not more than 10 feet can negotiate it.

Large vessels of deep draft can anchor anywhere, over mud bottom, in the northwestern part of the channel.

10A-60 Approaches to Kanal Malog Stona.—On the northeastern side of Neretvanski Kanal, Uvala Blaca is entered between Otočić Osinj and Rt Osik, ¼ mile southeastward. Four islets lie in the northern part of the bay which is silted up by Rijeka Mala Neretva. A light is shown on Mali skojic, situated about ¼ mile north-northeastward of Rt Osik. Between Uvala Blaca and the entrance to Zaliv Klek-Neum, 5 miles southeastward, the coast is steep and rocky, backed by high mountainous land with a church and



scattered dwellings visible. There are two coves suitable as anchorages for small vessels along this stretch of coast.

Zaliv Klek-Neum is entered between Rt Rep Kleka and Rt Meded, about $\frac{1}{2}$ mile northwestward. Rt Rep Kleka is fringed narrowly by shallow water but the northern entrance point is steep-to. Two points of land, each with an above-water off-lying rock rising from shallow water, about $\frac{3}{4}$ mile eastward of the outer entrance, form an inner entrance. The bay is $3\frac{1}{2}$ miles long and has an average width of about $\frac{1}{2}$ mile. With the exception of the before-mentioned shallow water, there are no hidden dangers in the bay and it is an excellent harbor for vessels of any draft. About 1 mile from the head of the bay on its northeastern side is a landing stage near the village of Neum which stands on a hill. Large vessels can anchor westward of Neum in the middle of the bay in 24m (13 fm) over mud, or nearer that place if necessary in about the same depth.

10A-61 On the southwestern side of Neretvanski Kanal, between Rt Rat, sec. 10A-39, and Rt Blaca, $3\frac{1}{2}$ miles southeastward, there is a bight encumbered with islets, rocks, and reefs, which have deep channels between them; the northwestern shore of the bight and several of the islets are fringed with shallow water. Otočić Goljak, 30 feet high, bare except for its summit, is the farthest off-lying islet and is situated about $\frac{1}{2}$ mile east-northeastward of Rt Rat. Dangers encumber the water between this islet and the land southwestward. No dangers lie northeastward of a line joining Otočić Goljak and Rt Blaca.

Luka Drače, situated $1\frac{1}{4}$ miles southward of Rt Rat, is protected northeastward by a right-angled breakwater, and southeastward by a shorter one. Small vessels not exceeding 11 feet draft can secure on the inner side of the outer angle of the northern breakwater, which is about 190 feet long. Small

vessels can anchor eastward of the harbor towards the southern end of Otočić Galičak, 108 feet high, lying about 1 mile east-northeastward of Luka Drače.

Uvala Brijesta lies southwestward of a tongue of land which terminates northwestward at Rt Blaca, on which there is a lighthouse and a conspicuous chapel farther southeastward. Large vessels can anchor in this bay at a distance of about 800 yards south-southeastward of Rt Blaca in 18.3m (10 fm) to 21.9m (12 fm) over good holding mud, about 400 yards offshore. Small vessels can anchor anywhere in the inner part of the bay.

Navigation aids.—Rt Blaca and the head of the northern breakwater at Luka Drače are each marked by a light.

Pličina Bililo, situated 450 yards offshore and $\frac{1}{2}$ mile southeastward of Rt Rat, is marked by a stone beacon, 10 feet high and painted in red and black bands.

10A-62 Kanal Malog Stona, between Rt Rep Kleka and Rt Nedjelja, $5\frac{1}{4}$ miles southeastward, is deep and clear of dangers. Several above-water rocks lie close off the northeastern shore. Rt Nedjelja, the northwestern extremity of a tongue of land projecting from Poluotok Pelješac, bisects the channel, and between Rt Čeljen, the southeastern end of the tongue of land, and the coast northeastward, the channel is narrowed to a width of about 300 yards. The channel widens perceptibly for about $\frac{3}{4}$ mile southeastward from Rt Čeljen to Rt Mirna, and contains two islets and the entrance to Zaliv Bistrina, entered to northward. The latter is 1 mile long, roomy and free of dangers at its head but anchoring is prohibited because of oyster beds.

From abreast Rt Mirna to abreast Rt Mali Voz, 1 mile southeastward, on the northeastern side of the channel, the depths decrease; the channel here is foul in places and narrow, and is available only for vessels drawing 10 feet or less. Pličina Vranjak lies on the

northeastern side of the channel eastward of Rt Mirna. Otočić Školjić lies on the southern side of the channel about $\frac{1}{4}$ mile west-northwestward of Rt Mali Voz. A vessel should not navigate this portion of the channel without local knowledge.

Southeastward of Rt Mali Voz, the channel widens and the depths in it increase to its termination at the head of Uvala Kuta. A group of three islets are situated on a reef in the middle of this part of the channel.

Navigation aids.—The following described positions are each marked by a light: Rt Čeljen, Rt Mirna, Pličina Vranjak, Rt Mali Voz and the shoal of Otočić Školjić.

Luka Mali Ston is situated at the head of a small inlet on the southwestern side of Kanal Malog Stona, close southwestward of Rt Mali Voz. The harbor is formed by two moles, with quays between, protected to northeastward by a detached breakwater. The village is walled and the southeastern mole has a conspicuous round tower on it. There are about 100 feet of berthing space with a depth alongside of 8 feet at the quay to northward and northwestward of the tower.

ANCHORAGES

10A-63 Koločepski Kanal.
Luka Lopud.—Section 10A-7.
Šipanski Luka.—Section 10A-7.
Luka Slano.—Section 10A-7.
Stonski Kanal.—Section 10A-8.
Mljetki Kanal.
Luka Sobra.—Section 10A-10.
Luka Polače.—Section 10A-10.
Luka Pomina.—Section 10A-11.
Ostrvo Lastovo.
Luka Trstenik.—Section 10A-12.
Skrivena Luka.—Section 10A-13.
Luka Velji Lago.—Section 10A-14.
Luka Mali Lago.—Section 10A-15.
Ostrvo Sušac.—Section 10A-15.
Zaliv Vela Luka.—Section 10A-17.
Lastovski Kanal.
Luka Brna.—Section 10A-18.

Luka Tri Luke.—Section 10A-18.
Ostrvo Vis.
Luka Rukavac.—Section 10A-19.
Zaliv and Luka Komiža.—Section 10A-19.
Luka Rogačić.—Section 10A-20.
Viška Luka.—Section 10A-21.
Luka Soline.—Section 10A-26.
Pakleni Kanal.—Section 10A-27.
Luka Hvar.—Section 10A-28.
Korčulanski Kanal.
Uvala Lovište.—Section 10A-30.
Uvala Luka.—Section 10A-32.
Pelješki Kanal.—Section 10A-35.
Uvala Luka.—Section 10A-34.
Kanal Ježevica.—Section 10A-34.
Luka Korčula.—Section 10A-35.
Neretvanski Kanal.—Section 10A-38.
Luka Gradac.—Section 10A-40.
Rijeka Neretva.—Section 10A-45.
Luka Kardeljevo.—Section 10A-55.
Kanal Malog Stona.—Section 10A-59.
Zaliv Klek-Neun.—Section 10A-60.
Luka Drače.—Section 10A-61.
Uvala Brijesta.—Section 10A-61.

PART B. RT PODKAPEĆ TO RT PLOČA INCLUDING ISLANDS AND CHANNELS NORTH OF OSTRVO HVAR

10B-1 Rt Podkapeć ($43^{\circ}08' N.$, $17^{\circ}17' E.$), the southeastern entrance point of Uvala Zaoštrog, lies on the mainland 4 miles eastward of Rt Sućuraj, at the junction of Hvarski Kanal and Neretvanski Kanal.

COAST—GENERAL

10B-2 From Rt Podkapeć the mainland coast trends 44 miles northwestward to Rt Marjan, the western extremity of a peninsula on which is situated Split and with Ostrvo Čiovo, to westward, forms the southern side of Kaštelanski Zaliv. A number of important industrial and maritime facilities are located in Kaštelanski Zaliv. Between the eastern end of this gulf and Rt Ploča,

22 miles westward, the coast is much indented and is fronted by numerous islets and rocks. This coast presents a diverse aspect of fertile, cultivated country and dry, barren land, backed by high bare-topped mountains.

A number of islands lie off this stretch of coast northward of Ostrvo Hvar, the principal being Ostrvi Brač, Šolta, and Čiovo. Deep water channels exist between these islands.

DANGERS

10B-3 With the exception of a number of reefs and rocks in the various channels and off-lying the islands and mainland coast of this area, which are described in their appropriate sections, the shores are steep-to for the most part.

Offshore, no dangers lie seaward of a line, bearing 142° – 322° , joining the southwestern extremity of Otočić Vodnjak Veli ($43^{\circ}10' N.$, $16^{\circ}19' E.$) (sec. 10A-26), and the southwestern extremity of Rt Ploča ($43^{\circ}30' N.$, $15^{\circ}58' E.$) (sec. 10B-28).

NAVIGATION

10B-4 Offshore.—The eastern Adriatic coastal track of 318° for northbound vessels from a mid-channel position in Biševski Kanal ($43^{\circ}00' N.$, $16^{\circ}03' E.$) to Pličina Albanež (Secca Pericolosa) Lighthouse, a distance of 140 miles, closes land nearest along this stretch of coast at a position about 18 miles southwestward of Rt Ploča.

Inshore.—Except for those areas in the inshore channels where dangers exist and for which navigational information is given with their descriptions, the eye is the best guide for navigation; the land here is universally bold.

CURRENT AND WIND

10B-5 Current.—Between Rt Podkapeč and Rt Ploča the coastal current flows

toward the northwest along the open coast and in the channels with a mean velocity of 0.5 knot. The tidal current affects somewhat the coastal current; the ebb is stronger than the flood. When the ebb flows in the same direction as the coastal current the resultant velocity may reach 1 knot along the open coast and in the larger channels, and 1.5 knots in the more constricted channels. Persistent winds from the northwest or south-east decrease or increase, respectively, the velocity of the current.

Wind.—Between Rt Podkapeč and Rt Ploča the bora blows with violence, especially close to the mainland, attaining its greatest force off Uvala Vrulja at the eastern end of Brački Kanal. The whole of Splitski Kanal and its entrance channels, as well as the southern shore of Ostrvo Brač, are swept with strong bora winds. An indication of an arriving bora is the formation over the coastal peaks of white clouds from which radiate small plumes.

When the sky becomes lead-colored it indicates a violent bora accompanied sometimes by gusts of hurricane force, which last briefly. With this indication present, the first violent gusts from the north or north-northeast are preceded by a brief period of calm.

The scirocco blows fresh through the channels between the islands and brings fog. It is forecast by the formation of clouds on the mountain summits of the mainland and principal islands; frequently the atmosphere becomes so clear that vessels can sight Promontorio del Gargano. The scirocco and the libeccio cause high seas and strong ebb tidal current near Rt Ploča and on the western sides of the islands.

In summer, the night land breeze from the east, and the day breeze from the northwest or west becomes established near the mainland coast.

LANDMARKS—COASTAL FEATURES

10B-6 The mainland coast between Rt Podkapeć and Rt Sveti Petar ($43^{\circ}18' N.$, $17^{\circ}01' E.$), 16 miles northwestward, is backed by high land presenting a few bare peaks; conical Vrh Susvid, 3,783 feet high, rising 4 miles northward of Rt Sućuraj, is the highest and most conspicuous of these peaks. There are a few scattered villages and the land is cultivated, but there is no good anchorage or large harbors. The coast is everywhere clear of dangers for deep-draft vessels at a distance of 300 yards offshore.

Uvala Zaoštrog is a small bight entered close northward of Rt Podkapeć. At the head of the bight there is a stone mole, about 180 feet long, with a depth of 13 feet at its outer end. Near the root of the mole there are a few houses and a monastery with a high belfry.

Uvala Igrane lies on the eastern side of Rt Igrane, $7\frac{1}{2}$ miles northwestward of Rt Podkapeć. A breakwater, quayed on its northern side and with alongside depths of 7 feet, extends about 175 feet east-northeastward from the village.

In Uvala Podgora, $4\frac{1}{4}$ miles northwestward of Rt Igrane, there are two harbors. In the eastern, there is a 160-foot quayed breakwater with a depth of 11 feet alongside. In Luka Podgora, the western harbor, there is a quayed basin for small craft protected by a quayed breakwater extending 125 feet eastward. The head of the eastern breakwater is marked by a light.

Luka Makarska is situated in a small bay protected to southwestward by Poluotok Sveti Petar, 4 miles northwestward of Luka Podgora. The steep red cliffs of the small peninsula, with a chapel atop it and the lighthouse on its western point, are conspicuous landmarks. The entrance, which is 262 yards wide, has a depth of 6 to 8 fathoms in the fairway. The village of Makarska, population about 3,100, is situated on the northeastern side of the bay and is fronted by a

quay. There is a mole, 210 feet long and 40 feet wide, with a depth of 13 feet at its head, extending southwestward from near the harbor master's office. A damaged quay lies northwestward of this mole. A small jetty is located southward of the mole. Small and medium-sized vessels normally use this bay. Southwesterly and west-southwesterly winds create large swells in the bay, and during a bora the maneuverability of vessels is extremely difficult. The town has telephone, telegraph, and hospital facilities.

An anchorage in 22 fathoms over good holding ground is situated with Rt Sveti Petar Lighthouse bearing 341° , distant 850 yards. Another anchorage in 12 fathoms is located in the middle of Uvala Donja Luka on the northern side of Poluotok Sveti Petar.

Rt Sveti Petar, the northwestern extremity of Poluotok Sveti Petar, and the head of the mole are each marked by a light.

OSTRVO BRAČ

10B-7 General description.—Ostrvo Brač lies northward of the northwestern part of Ostrvo Hvar with Rt Lašćatna ($43^{\circ}19' N.$, $16^{\circ}54' E.$), its eastern point, $5\frac{1}{2}$ miles west-northwestward of Luka Makarska. The island is 21 miles long from its eastern point to Rt Ražanj, its southwestern point, and averages about 7 miles wide. The mountainous southern coast falls steeply into the sea and is bare except in the vicinity of Bol. The highest peak, Vidova Gora, 2,552 feet high, is located 1 mile inland from the southern coast. The indented eastern shore is low, rocky, and arid. The mountains, which are wooded, slope gently with rolling hills northward and westward. The valleys are well cultivated with vineyards, olive groves, forests, and pasture. Ostrvo Brač is the highest of all Adriatic islands, and is the most populated and fertile of the Dalmatian group.

Its coast forms the boundaries of Brački Kanal to northward, Splitski Vrata to westward, and Hvarski Kanal to southward.

HVARSKI KANAL

10B-8 General description.—Hvarski Kanal is the passage between Ostrvo Hvar and Ostrvo Brač, northward, and is about $1\frac{3}{4}$ miles wide at its narrowest part. There are no hidden dangers, except the spit extending 300 yards southward from Dugi Rat, on the northern side of the channel, 10 miles east-southeastward of Rt Ražanj. The bottom of the channel is mud and sand and has a least depth of 40 fathoms in the fairway.

The channel is entered from westward between Rt Pelegrin ($43^{\circ}12' N.$, $16^{\circ}22' E.$) (sec. 10A-26), and Rt Ražanj, $7\frac{3}{4}$ miles north-northeastward. At its eastern end, Hvarski Kanal leads southeastward into Neretvanski Kanal, northwestward into Brački Kanal, and is entered between Rt Lašćatna and the northern coast of Ostrvo Hvar, 9 miles southward.

Hvarski Kanal is seldom used except by vessels bound to Luka Makarska.

For general description of Ostrvo Hvar, see section 10A-26.

10B-9 Current and wind.—The normal current in the channel is west-going, being stronger in the eastern part where it may reach a velocity of 0.8 knot. With strong southeasterly winds the velocity is increased and produces an easterly counter current along the northern side of Ostrvo Hvar between Rt Pelegrin and Rt Kabal which may reach 2 knots.

The eastern part of the channel is much exposed to the bora which blows with great violence and with whirls near Bol. Northwesterly and southeasterly winds are also strong and raise a sea; southwesterly winds, sometimes strong, send a rough sea against the southern coast of Brač.

10B-10 On the southern side of Hvarski Kanal, the northwestern shore of Ostrvo

Hvar, between Rt Pelegrin and the southwestern entrance point of Starigradski Zaliv, about 6 miles eastward, is bold and indented by numerous small coves, the land rising steeply to heights of from 350 to 1,300 feet.

Starigradski Zaliv is formed between a conspicuous and profusely indented promontory, from 223 to 423 feet high, projecting about $2\frac{1}{2}$ miles northwestward from the northern coast of Ostrvo Hvar, on its northeastern side, and a point $1\frac{1}{4}$ miles southwestward. The bay is about 4 miles long and has a minimum width of $\frac{3}{4}$ mile; there is deep water over mud and sand without hidden dangers anywhere to within 250 yards of the shore. Rt Kabal ($43^{\circ}14' N.$, $16^{\circ}31' E.$), bold and steep-to, is the western end of the promontory which has a sea face of about $2\frac{1}{4}$ miles.

The bay is exposed only to rare westerly winds and provides excellent shelter from the bora. When the bora blows with a force of 10, Beaufort scale, in Hvarski Kanal, a force of only 3 is felt in Luka Starigrad, which is entered from the southeastern part of Starigradski Zaliv.

Anchorage can be taken in 13 to 15 fathoms, westward of Starigrad. Anchorage, in 16 to 19 fathoms can be taken in the center of Luka Tiha.

Rt Kabal is marked by a light.

Luka Starigrad consists of a narrow inlet, about $\frac{1}{2}$ mile long, entered from the southeastern part of Starigradski Zaliv between Rt Fortin and the shore northward, providing an entrance 130 yards wide, in which there is a depth of about 26 feet in the fairway; the depths decrease toward the head and shores of the inlet. The town of Starigrad, population about 3,000 is situated at the foot of high hills on the southern side of the inlet and at the western end of a prominent valley leading eastward to Vrbos-

ka. Much of the head of the inlet is quayed for boats, but the principal quay fronts the town; this quay is about 460 feet long and has depths alongside its eastern part of 8 to 11 feet. The inlet is 150 yards wide at this position. The western end of this quay is fringed with shallow water, the northern extremity of which is marked by a black conical buoy surmounted by a cone. The remainder of the quay has a depth of about 14 feet a few yards offshore.

During a strong scirocco, the water level rises rapidly within the port.

Rt Fortiñ and the western end of the principal quay are each marked by a light.

10B-11 On the southern side of Hvarski Kanal, between the northeastern point of the promontory which forms the northeastern side of Starigradski Zaliv, and Rt Planirat, $4\frac{1}{4}$ miles east-southeastward, the shore of Ostrvo Hvar is bold, steep-to, and much indented, whence, it trends $2\frac{1}{4}$ miles south-southeastward to Rt Glavica. The latter point, 85 feet high, is the eastern end of a peninsula which is yellowish in color near its water line.

Otočić Zečevo, 92 feet high, lies northward of Rt Glavica and 700 yards offshore. The eastern point of the islet is marked by a light.

Luka Vrboska is entered between Rt Glavica and a point, $\frac{1}{2}$ mile southward. The outer harbor consists of a bay, about 900 yards in diameter with depths of 6 to 14 fathoms to a distance of 150 yards offshore, situated close southwestward of Rt Glavica. The inner harbor is comprised of a narrow inlet, which extends $\frac{3}{4}$ mile northwestward to the first of three bridges, and is entered from the western side of the outer harbor through an entrance 300 yards wide, southward of Rt Križ. The head of the inner harbor is quayed and is suitable only for small craft. The southeastern quay which extends 190 feet northwestward from the

harbor light structure has a depth of about 10 feet alongside. The village of Vrboska, population about 1,000 lies mostly on the southern side of the head of the inner harbor.

A strong scirocco causes a high water level; water enters the inlet in swift waves and causes a rise of about 6 feet, flooding the village and damaging vessels berthed alongside.

Anchorage, in 13 to 15 fathoms, is located in the center of the outer harbor.

Rt Križ and the southeastern corner of the principal quay are each marked by a light.

Luka Jelsa, a small inlet about $\frac{1}{2}$ mile long and open to northeastward, is entered between Rt Gradina ($43^{\circ}10' N.$, $16^{\circ}42' E.$), $\frac{3}{4}$ mile south-southeastward of Rt Glavica, and a point, 450 yards westward. Two breakwaters protect a quayed inner harbor about 275 yards long and 165 yards wide; the entrance between the heads of the breakwaters is about 130 yards wide and has a depth of 18 feet in the fairway. There are two quays with 6 to 13 feet alongside in the harbor. Small vessels can anchor in the middle of the entrance in 6 fathoms, southwestward of Rt Gradina.

The head of the northern breakwater and the head of a pier which is located on Rt Gradina are each marked by a light.

10B-12 On the northern side of Hvarski Kanal, from Rt Ražanj, the coast trends 6 miles east-southeastward and then the same distance eastward to Luka Bol. The western part of this stretch of coast is indented with a number of coves suitable for sheltering only small craft.

Dugi Rat, situated 1 mile westward of Luka Bol, is a low, yellow spit from which, as well as from the coast for a distance of about $\frac{3}{4}$ mile eastward, foul ground extends about 400 yards offshore. A chapel stands a short distance northeastward of Dugi Rat.

Luka Bol ($43^{\circ}16' N.$, $16^{\circ}39' E.$).—Bol, population about 2,500, is the principal town of Brač and extends nearly $\frac{3}{4}$ mile along the coast at the foot of Vrh Vidova Gora, about 2 miles northwestward (sec. 10B-7). This peak is a good distance mark. Near the center of the village there is a small quayed harbor, protected on its eastern side by an angular breakwater, and by a shorter straight one on its western side. Small craft drawing not more than $6\frac{1}{2}$ feet can secure to the inner side of the outer part of the eastern breakwater. The head of the eastern breakwater is marked by a light.

Large vessels anchor, in 11 to 13 fathoms south of the town.

On the northern side of Hvarski Kanal, from Luka Bol, the coast trends $9\frac{1}{2}$ miles eastward to Rt Sumartin, which is low, thence, $2\frac{1}{2}$ miles north-northeastward with indentations to Rt Lašćatna, a low, rocky point sloping gently from a hill.

Luka Sumartin is situated at the northeastern head of a bay at the foot of a valley and is entered directly westward of Rt Sumartin. The harbor, which is partially quayed, is protected southwestward by a breakwater, 177 feet long. There are two moles for shallow draft craft; one is located at the northwestern side of the harbor, and the other on the northeastern. Small vessels drawing up to 10 feet can secure to the inner side of the breakwater. Anchorage in 16 to 21 fathoms, maybe had in the middle of the entrance of the bay.

Rt Sumartin and head of the breakwater are each marked by a light.

On the southern side of Hvarski Kanal, from Rt Gradina, the southeastern entrance point of Luka Jelsa, the coast trends almost straight for 22 miles eastward to Rt Sućuraj. There is no place of shelter, with the exception of a small cove here and there, along this stretch of coast and the depths are considerable close inshore. Pličina Bristova, a reef with a depth of 27 feet, lies 8 miles westward of Rt Sućuraj and about $\frac{1}{2}$ mile offshore.

BRAČKI KANAL

10B-13 General description.—Brački Kanal is entered from Splitski Kanal on its western end between Rt Sveti Juraj ($43^{\circ}23' N.$, $16^{\circ}26' E.$), the northwestern extremity of Ostrvo Brač, and Luka Split, $6\frac{3}{4}$ miles northward. The channel is about 24 miles long to its southeastern entrance at the eastern end of Hvarski Kanal between Rt Lašćatna and Rt Sveti Petar, sec. 10B-6. The channel is $2\frac{3}{4}$ miles wide at its narrowest part and has depths of 21 to 43 fathoms over mud in its fairway.

The mainland shore between Luka Makarska and Sidrište Omiš, 17 miles northwestward, consists of a high and steep mountain range which northwestward from the latter position decreases in height and withdraws more inland. The gorge at Uvala Vrulja, described below, is conspicuous.

Dangers.—The greater length of the shores of Brački Kanal are steep-to. With the exception of a reef having a depth of 26 feet extending southward for about 3 miles from the mainland shore between Luka Split and Uvala Stobreč, 4 miles eastward, and a detached 16-foot patch lying about $\frac{1}{2}$ mile northward of Luka Supetar, on the northwestern coast of Ostrvo Brač, deep water lies everywhere to a distance of 600 yards offshore.

Current.—Under normal conditions there is a westerly and easterly tidal current; under the influence of a prolonged scirocco and when the Cetina and Neretva Rivers are swollen, a continuous westerly current is produced, which may reach a velocity of 2.5 knots in the eastern and narrower part of the channel and 1.5 knots in the western part.

Wind.—The channel is exposed to sudden and violent bora squalls which, particularly along the coastal stretch between Sidrište Omiš and Luka Makarska, can blow from any direction and with hurricane force. Brief and unpresaged squalls are not rare in this vicinity even in summer.

Caution.—At Uvala Vrulja, situated $8\frac{1}{2}$ miles northwestward of Rt Sveti Petar, a conspicuous gorge in the coastal mountains allows the bora to funnel through the mountains with particular violence, which often commences suddenly without warning even in summer, but in the latter case it is of brief duration.

10B-14 On the northeastern side of the channel, the coast, which is barren and desolate, trends $8\frac{1}{2}$ miles northwestward from Rt Sveti Petar to Uvala Vrulja, where, southward of the conspicuous gorge in the coastal range, the mountains rise to greater elevations than westward of it. Sveti Jure, a mountain 5,780 feet high, situated about $3\frac{1}{2}$ miles northeastward of Rt Sveti Petar, is the highest in the vicinity, and, like others northwestward, its upper part is whitish and bare.

From Uvala Vrulja the coast trends 8 miles west-northwestward to the southeastern entrance point of Sidriste Omis and contains, similarly with the southeastern section of this stretch of coast, several coves suitable for sheltering small vessels.

Lights.—The head of the mole at Uvala Baška Voda, situated $4\frac{1}{2}$ miles northwestward of Rt Sveti Petar, the head of the mole at Uvala Stomarica, located 2 miles northwestward of Uvala Baška Voda, and the head of the breakwater at Uvala Kutleša, located $3\frac{1}{2}$ miles westward of Uvala Vrulja, are each marked by a light.

10B-15 Sidrište and Luka Omiš ($43^{\circ}27' N.$, $16^{\circ}42' E.$).—The roadstead of Omiš, which is flanked a short distance inland by high land, lies $8\frac{1}{2}$ miles westward of Vrulja and is entered between Dugi Rat and a point, about $3\frac{1}{4}$ miles east-southeastward. Rijeka Cetina, a shallow but one of the important rivers of Yugoslavia, enters the northwestern side of the roadstead through a prominent mountain gorge. The entrance channel of the river, which alters constantly, has a depth of 0.9m (3 ft.). Shallow water, developed by river sediment, fronts the northwestern

side of the roadstead for a distance of as much as 800 yards, and southwestward of Dugi Rat for a distance of 400 yards.

The town of Omiš lies on the southeastern bank of the river mouth. The harbor is situated southeastward of the town at the head of the deep water of the roadstead.

Conspicuous are: a mountain, 1,020 feet high, with ruins atop, situated 600 yards eastward of the town; a monastery on the shore, 500 yards south-southeastward of the harbor; a cement factory at Ravnice, 1 mile farther south-southeastward; Vrh Borak, 2,835 feet high, bare and steep-sided, situated 1 mile east-northeastward of Ravnice; and a factory with three furnaces on the western side of Dugi Rat.

The harbor consists of a quayed section of the southeastern shore of the town, from the southern part of which an l-shaped mole extends southwestward and then southeastward. There is a concrete wharf at the cement factory at Ravnice, close off the southern end of which is anchored a mooring buoy.

Navigation aids.—The monastery and the head of the mole are each marked by a light.

The eastern edge of the river shallows near the harbor is marked by two red conical buoys each surmounted by a cylinder. The moorings of these buoys can not be depended upon.

The western extremity of the shoal extending west-southwestward from Dugi Rat is marked by a black conical buoy surmounted by a cone.

Five submarine cables are laid across Bracki Kanal from Ostrvo Brac to the mainland. A submarine cable is laid southward from Rt. Sv. Stjepan across Bracki Kanal to Rt. Lwka.

There is an anchorage berth, 300 yards in diameter, in 28m (15 fm) to 35m (19 fm) over mud and sand, close westward of the monastery. Large vessels requiring more room can

anchor farther south-southwestward of the Monastery in about 51m (28 fm).

Pilotage for Ravnice is compulsory. Pilots are obtained day and night off the entrance to Luka Split.

Directions for clearing Rijeka Cetina Shoals.—Vessels should not permit the monastery or the light thereon to bear more than 071° , and should not head for the inner roadstead or for Luka Omiš with the head of the mole bearing more than 032° .

10B-16 Facilities.—Omiš, population about 3,000, is situated on the southeastern bank of Rijeka Cetina. Besides the cement factory at Ravnice, the town has a rope works and a small boat building yard. There is a berth, 150 feet long with an alongside depth of 3.3m (11 ft.), on the southwestern side of the outer section of the mole, and the northeastern or opposite of this section of the mole is 112 feet long with a depth of 3.9m (13 ft.) alongside. The remainder of the mole and the quays are suitable only for small craft. The wharf at Ravnice has a depth of 5.2m (17 ft.) for the northern 295 feet of its length. The water deepens rapidly off this wharf.

10B-17 The southern side of Brački Kanal is formed by the northern coast of Ostrvo Brač from Rt Lašćatna, its eastern extremity, to Rt Sveti Juraj, $21\frac{1}{2}$ miles west-northwestward. Westward from a position about 7 miles west-northwestward of Rt Lašćatna, the land gradually alters from the completely barren region of that cape to a more cultivated narrow belt of land between the mountains and the shore on which are situated numerous villages. There are several small harbors on this coast, principal of which is Luka Supetar. Rt Lascatna is marked by a light.

A bay in which are several coves is entered between Rt Sveti Ante, $3\frac{1}{2}$ miles west-northwestward of Rt Lašćatna, and Crni Rat $\frac{1}{2}$ mile farther west-northwestward. Luka Povja, situated in the southeastern cove, has a mole and a quay for small craft on its northeastern side. There is a depth of 2.4m (8 ft.) alongside the head of the mole. Rt Sveti Ante is marked by a light.

Luka Pusišća lies in the southwestern arm

of a narrow inlet, about $\frac{3}{4}$ mile long, and is entered close eastward of Rt Sveti Nikola, $4\frac{1}{4}$ miles west-northwestward of Rt Sveti Ante. The village of Pušišća, population about 2,000, surrounds a quayed harbor, the western part of which is protected by two short breakwaters. There is a quay, 410 feet long with depths of 3.3m (11ft.) to 3.9m (13 ft.) alongside, situated directly northeastward of the northern breakwater. In the arm of the inlet eastward of Luka Pusišća there is a quay, 130 feet long with a depth of 3m (10 ft.) alongside, for loading stone removed from the quarry on the eastern entrance point. Rt Sveti Nikola is marked by a light.

Luka Postire, about 5 miles west-northwestward of Rt Sveti Nikola, is protected by a breakwater; between the breakwater and a short mole, southward, there is a quay. Small craft can secure to the quayed inner side of the breakwater. Depths in the harbor are about 5.8m (19 ft.) and about 1.8m (6 ft.) at the head of the pier and alongside the breakwater. The village of Postire, population about 1,500, lies on the eastern side of the harbor. The head of the breakwater is marked by a light.

Luka Splitska, which is small and narrow, is situated in the eastern arm of Uvala Splitska, about 1 mile westward of Luka Postire. The eastern entrance point, which is low and has a cemetery, is marked by a light.

Luka Supetar ($43^{\circ}23' N.$, $16^{\circ}33' E.$), 2 miles westward of Luka Splitska, is located at the southeastern end of a bay, the northwestern entrance point of which is low and wooded and has a mausoleum and a chapel on it. The village of Supetar, population about 1,500, is situated conspicuously on a hill close southward of the harbor. The harbor is protected northward by a breakwater, 285 feet long, and westward by a shorter jetty. A trapezoidal mole lies southward of the breakwater; the remainder of the harbor is quayed for boats. Craft drawing 8 feet can secure to the mole and to the inner side of the

breakwater. The head of the breakwater is marked by a light.

An isolated, steep-to rocky patch with a depth of 4.9m (16 ft.), lies 1/2 mile northward of the breakwater. The church in the village in range with the light structure leads westward of this patch.

Large vessels can anchor northward of the harbor in 26m (14 fm) over sand, avoiding the rocky patch, mentioned above.

Luka Sutivan, situated 3 1/2 miles westward of Luka Supetar and 2 miles eastward of Rt Sveti Juraj, the northwestern extremity of Ostrvo Brač, is protected to northeastward by a breakwater, 320 feet long, and to northwestward by a shorter one. Small vessels drawing up to 10 feet can secure to the inner side of the outer part of the breakwater; only boats can secure to the quays of the harbor. The head of the northeastern breakwater is marked by a light.

Large vessels can anchor in 20.1m (11 fm) to 29m (16 fm) over mud northward of Luka Sutivan.

10B-18 On the northeastern side of Brački Kanal, Uvala Orišac is entered between Dugi Rat (sec. 10B-15), and a point 3/4 mile northwestward. Luka Dugi Rat is situated on the eastern side of this bay and consists of two wharves at a cement factory. The southern is of stone, 170 feet long with a depth of 3.3m (11 ft.) alongside; a rubble breakwater extends west-southwestward from its southern end. Close northward of this wharf is another of concrete, 197 feet long with a depth of 6.1m (20 ft.) alongside; the depths here increase rapidly offshore. Two mooring buoys are located offshore of of this wharf. Pilotage is compulsory for this harbor; pilots can be obtained day and night off the entrance to Luka Split.

Uvala Krilo, 2 1/2 miles northwestward of Dugi Rat, lies close eastward of the point of the same name. Fronting the village of Krilo are two moles with an intervening

quay for boats. The eastern mole is 180 feet long and has depths of 4.2m (14 ft.) to 5.2m (17 ft.) alongside. The head of this mole is marked by a light.

A conspicuous hill, 364 feet high, rises close northeastward of Rt Mutogras, situated 3/4 mile northwestward of Rt Krilo.

Luka Stobreč (43°30' N., 16°32' E.), situated 3 miles northwestward of Rt Mutogras, consists of a bay entered close eastward of a conspicuous, steep-sided peninsula on which stands the village of Stobreč. The head of the bay into which flows Rijeka Žrnovica is shallow; low rocks extend 85 yards eastward from the head of the mole at the village. The northwestern side of this mole, 144 feet long, has a depth of about 3m (10 ft.) alongside. A wooden pier, about 328 feet long with a depth of 3.4m (11 1/2 ft.) alongside, juts out from the tip of the small peninsula at the head of the bay. Mooring buoys are found near the pier.

This bay is not recommended as an anchorage.

Between Luka Stobreč and Luka Split, 4 miles westward, the coast is bordered by shallow water about 400 yards wide in places. A detached reef with depths of 8.3m (4 1/2 fm) over its northern end, and 17.1m (9 1/4 fm) over its southern end, lies from 3/4 to 2 miles offshore, midway between the two harbors. Another detached reef with a depth of 14.1m (7 3/4 fm) lies 3/4 mile southeastward of the southern end of the other reef.

ISLANDS IN THE APPROACHES TO SPLIT—OSTRVO ŠOLTA

10B-19 General description.—Ostrvo Šolta, 10 miles long and about 2 1/4 miles wide, lies with its southeastern extremity, Rt Livka (43°20' N., 16°24' E.), 1/2 mile westward of the southwestern extremity of Ostrvo Brač from which it is separated by Splitska Vrata.

Šolta differs in orientation from all the other Dalmatian Islands in that its axis lies in a northwest-southeast direction. The shores of the island, which are much indented, rise to wooded hills, the highest being one, 777 feet high, near the southeastern end of the island, and another, 682 feet high, located close westward of the middle of the island. The southwestern side of the island slopes more steeply than the northwestern. In the center of the island, between the coastal hills, is a flat cultivated plain, 3 miles long and 1 mile wide. Fronting the western end of the island and lying on the southeastern side of Šoltanski Kanal are seven islets, the westernmost being Otočić Stipanska, situated about $1\frac{1}{2}$ miles west-southwestward of Rt Obinuš, the northwestern point of Šolta. The shores of the island are steep-to except for shallow water lying between the island and some of the off-lying western islets.

OSTRVO DRVENIK VELIKI

10B-20 General description. — Ostrvo Drvenik Veliki lies midway between the northwestern end of Ostrvo Šolta and the mainland coast northwestward, dividing the western passage to Splitski Kanal into two channels, Šoltanski Kanal to southward, and Drvenički Kanal to northward. The island is 3 miles long and has a greatest width of 2 miles. From a distance it appears as a long ridge rising northeastward to a summit, 581 feet high. The northeastern side of the island is wooded and the southern side has olive groves and is cultivated. With the exception of the northeastern side its shores are indented. Two islets lie close off its eastern point, to which they are connected by a shoal; with this exception the island is steep-to.

OSTRVO DRVENIK MALI

10B-21 General description. — Ostrvo Drvenik Mali lies about 1 mile westward of Ostrvo Drvenik Veliki and is readily distinguished from the latter by its complete cultivation of vineyards and olive groves. The island is 2 miles long and hilly, the highest hill being 262 feet high. Its shores are

irregular, and except in the coves and for a reef bordering its northwestern extremity for a distance of 300 yards, are steep-to.

Large vessels anchor in Uvala Vela Rina, located on the southern side of the island. The anchorage, over good holding sand, provides good protection from northerly winds and poor protection from southerly winds.

OSTRVO ČIOVO

10B-22 General description. — Ostrvo Čiovo lies about 4 miles northward of the northwestern part of Ostrvo Šolta and is separated from the mainland coast at Trogir by the narrow, shallow Trogirski Kanal. Čiovo is $8\frac{1}{4}$ miles long and has a greatest width of 2 miles. The western part of the island consists of a peninsula, $2\frac{3}{4}$ miles long, which, with the mainland coast northward, forms Zaliv Saldun. Its northeastern side forms the southwestern shore of Kaštelanski Zaliv; its southern side forms the northern shore of Splitski Kanal. The highest hill, near the middle of the island, rises to a height of 715 feet, but is scarcely distinguishable from the nearly uniform profile of the island. The northeastern part of the island is cultivated densely with olive groves; the remainder is covered with low shrubs. The southeastern shore of the island is bold and steep-to. Three islets lie off the southwestern shore, to which they are connected by a shoal.

APPROACHES TO SPLIT AND TO KAŠTELANSKI ZALIV

10B-23 General description.—Split, the second seaport in importance in Yugoslavia, lies on the northern side of the eastern end of Splitski Kanal, which can be entered from southward and westward by three channels. Kaštelanski Zaliv, which contains several important shipping facilities, is entered close westward of Split.

Splitski Vrata, the southernmost and narrowest of these channels, lies between Ostrvo Brač and Ostrvo Šolta; Šoltanski Kanal, the middle one, lies between Ostrvo Šolta and Ostrvo Drvenik Veliki; and Drvenički Kanal,

the northernmost, lies between Ostrvo Drvenik Mali and Ostrvo Drvenik Veliki, on its southern side, and the mainland, on its northern side. Brački Kanal, which enters Splitski Kanal from southeastward, is described in section 10B-13.

There are a number of islets and rocks off-lying the mainland coast and the principal islands described above, which will be described, according to their importance, with the channels in which they lie.

SPLITSKA VRATA AND ITS NORTHERN APPROACH

10B-24 Splitska Vrata is the shortest and most frequented passage from southward to Luka Split and ports in Kaštelski Zaliv. Though only 850 yards wide, it presents no navigation difficulties by day. It was reported (1961) that navigation lights in this passage were weak and local knowledge is necessary at night. There are depths of 10 to 16 fathoms in its fairway.

The normal current in the passage is tidal in a north-south direction, the south-going being stronger and of longer duration.

The eastern side of the passage, between Rt Ražanj ($43^{\circ}19' N.$, $16^{\circ}24' E.$) and Rt Zaglav, 1 mile northward, which reaches an elevation of 262 feet, is formed by a peninsula extending from the southwestern end of Ostrvo Brač, and is higher than the western side. Depths of less than 6 fathoms extend about 200 yards westward from Rt Ražanj, and for a shorter distance from the shore northward.

The western side of the passage is formed by a promontory extending southeastward from Ostrvo Šolta, which terminates at Rt Livka, where the narrowest part of the passage is encountered. Depths of less than 6 fathoms extend about 300 yards southward and southeastward from the promontory.

Otočić Mrdulja, 30 feet high and steep-to, lies $\frac{1}{4}$ mile northward of Rt Zaglav. A light is shown on the islet.

Rt Ražanj and a position $\frac{1}{4}$ mile northeastward of Rt Livka are each marked by a light. A fog signal is sounded at Rt Ražanj. Anchorage is prohibited between Rt Ražanj and a point about $\frac{1}{2}$ mile southwestward of Rt Livka.

Northern approach to Splitska Vrata.—The western side of Ostrvo Brač, between Rt Zaglav and Rt Sveti Juraj, $3\frac{1}{2}$ miles north-northeastward, forms the eastern side of the northern approach to Splitska Vrata, and the northeastern side of Ostrvo Šolta, from Rt Livka to Rt Pelegrin, 3 miles northwestward, forms the southwestern side of that approach. The western side of Ostrvo Brač is indented by Luka Milna and several coves.

Luka Milna, the best harbor of Ostrvo Brač, is entered between Rt Zaglav and Rt Bijaka, about 1 mile eastward. The harbor consists of a large outer part and a shallow restricted inner harbor with two arms entered through an inlet, $\frac{1}{2}$ mile long. Small vessels can secure to the quays of the inner harbor in 8 to 16 feet of water, using the Mediterranean moor; shallow water fronts all the quays. Large vessels can anchor in 16 fathoms over fine sand in the middle of the outer harbor. Anchorage is prohibited in the entire entrance of the harbor. The town of Milna, population about 2,000, is situated at the head of the inner harbor.

Rt Bijaka, the center of the northeastern quay of the inner harbor of Luka Milna, and the eastern entrance point of Uvala Stomorska, 550 yards westward of Rt Pelegrin are each marked by a light.

Pilotage.—Upon request pilots will board vessels in Splitska Vrata off Rt Ražanj Light ($43^{\circ}19' N.$, $16^{\circ}25' E.$).

Directions for Splitska Vrata.—Vessels arriving from southward, by night, should pass about 400 yards westward of Rt Ražanj; when abreast of the lighthouse, alter course to 000° and pass through the passage.

Vessels arriving from northward, by night, should steer 170° , heading for the lighthouse on Rt Ražanj. When the light on Rt Bijaka (Luka Milna) is hidden by Rt Zaglav, alter course to 180° . Course should be altered to 225° as soon as Rt Ražanj Light bears 158° in order to avoid the shoal area off this point.

ŠOLTANSKI KANAL

10B-25 General description. — Šoltanski Kanal is entered from southwestward between the islets off-lying the western side of

Ostrvo Šolta, on its southeastern side, and the islets off-lying the southwestern side of Ostrvo Drvenik Veliki, on its northwestern side. From northeastward it is entered between Rt Ovinuš ($43^{\circ}25' N.$, $16^{\circ}12' E.$), the northwestern point of Ostrvo Šolta, and Rt Novica, about 2 miles northwestward, the southeastern point of Ostrvo Drvenik Veliki.

An isolated shoal with a depth of 21 feet lies nearly in midchannel at the southwestern entrance, and an isolated rocky patch with a depth of 32 feet lies on the northwestern side of mid-channel at the northeastern entrance. With these exceptions there is a least depth of 11 fathoms in the fairway of the channel.

Šoltanski Kanal is swept by the full force of the bora; the scirocco blows at right angles across the channel but also is deflected into it at both ends.

The current is mostly tidal and is affected greatly by winds, especially the scirocco. The west-going ebb current, under the influence of the scirocco, may attain a velocity of 2 knots and run from 12 to 18 hours, producing eddies. When the west-going current is strong at the northeastern entrance to the channel it sets on the eastern end of Ostrvo Drvenik Veliki, which divides the current into Drvenički Kanal and Šoltanski Kanal.

The following anchorages in Splitski Kanal are protected from all winds: Zaliv Trogirski, Zaliv Kastelanski, Split, Milna, Otocić Stipanska, and Uvala Babovisco.

10B-26 On the southeastern side of Šoltanski Kanal, the western end of Ostrvo Šolta is indented by three small bays. Luka Maslinica is situated at the head of the middle bay and is entered close northward of Rt Sveti Nikola and between the off-lying islets. On the northern side of the harbor is a quay, 65 feet long with a depth of 10 feet alongside. A mooring buoy is about 300 yards north-northeastward of Rt Sveti Nikola.

Otočić Stipanska, 223 feet high and distinguishable from the other islets by its dense covering of dark green shrubs, is the westernmost and largest islet off-lying the western end of Ostrvo Šolta.

10B-27 On the northwestern side of the channel, the shores of Ostrvo Drvenik Veliki are indented and steep-to. Two islets lie close off the southeastern end of the island to which they are connected by a shallow shoal. Off-lying southward of the western end of Ostrvo Drvenik Veliki, are two islets; Otočić Orud, 95 feet high and on which are some dwellings, lies about $\frac{3}{4}$ mile offshore, and smaller Otočić Mačaknar, 49 feet high and bare, lies about 400 yards farther southeastward. These two islets should not be approached closer than 400 yards.

Small vessels with local knowledge can anchor in the two southernmost small bays on the western end of Ostrvo Šolta.

Rt Sveti Nikola is marked by a light.

Directions for Šoltanski Kanal.—The best channel for large vessels is between the 21-foot patch and Otočić Stipanska. Since the western sides of this islet and Rt Obinuš are steep-to they may be passed close-to, avoiding thereby the shoal patch and the occasional on-setting current at the eastern end of Ostrvo Drvenik Veliki.

Unless Otočić Stipanska can be made out clearly, large vessels should avoid this channel at night because it is not marked by lights.

Caution.—Vessels bound northeastward from Šoltanski Kanal must avoid Pličina Mlin (Mačina), described in section 10B-31.

DRVENIČKI KANAL

10B-28 Western approach.—Between Rt Ploča (sec. 10B-2), and Rt Čović, the northwestern entrance point of Drvenički Kanal, 4 miles east-southeastward, the mainland coast, which is steep and rocky, is indented with three bights. A number of islets and above-water rocks lie off this stretch of coast and they may be passed on their southwestern sides close-to. Otočić Arkandel, 259 feet high, is the largest and southernmost of these islets and is situated with its eastern end 1 mile westward of Rt Čović; a conspicuous ruin stands on the northeastern slope of the islet. Otocić Muljica, close westward of Otocić Arkandel, is marked by a light.

Anchorage.—A large vessel can anchor in 11 to 17 fathoms over sand in the northeastern part of Uvala Stari Trogir, the easternmost and best of the three bights, previously mentioned.

10B-29 General description.—Drvenički Kanal is entered from westward between Rt Čovik ($43^{\circ}29' N.$, $16^{\circ}04' E.$) and Rt Rat, the western extremity of Ostrvo Drvenik Mali, about $1\frac{1}{2}$ miles southward. At its eastern end it enters Splitski Kanal between the eastern end of Ostrvo Drvenik Veliki and Rt Jelinak, the western entrance point of Trogirski Zaliv, 3 miles northward. The channel is 5 miles long, 1 mile wide at its narrowest part, and has depths of 30 to 43 fathoms in its fairway.

Wind and current.—The bora blows from the mainland into the channel at an angle and produces violent squalls of variable direction at the entrances to the inlets. The scirocco follows the axis of the channel and produces a considerable sea.

The normal west-going current has a velocity of 0.5 knot. The scirocco increases this velocity but after the cessation of that wind, a temporary lesser east-going current is experienced.

10B-30 On the northern side of Drvenički Kanal between Rt Čovik and Rt Jelinak, the mainland coast is bold, steep-to, and is indented by a bight and an inlet. Luka Vinišće, the easternmost of these, is narrow and provides an anchorage for small vessels. Hrid Vinišće, 10 feet high, bare and light in color, lies close southward of the entrance to Luka Vinisce. A light is shown on Rt Artatur, the western entrance of Luka Vinisce, located about 3 miles eastward of Rt Čovik.

On the southern side of the channel, the northern shores of Ostrvo Drvenik Mali and Ostrvo Drvenik Veliki are steep-to with the exception of a reef bordering the northwestern extremity of Ostrvo Drvenik Mali for a distance of 300 yards. A light is shown on the northern shore of Ostrvo Drvenik Mali about $1\frac{1}{4}$ miles south-southeastward of Rt Čovik.

A light is shown on the northeastern shore of Ostrvo Drvenik Mali about $1\frac{1}{4}$ mile southward of its northeastern extremity.

Luka Drvenik consists of an inlet, $\frac{3}{8}$ mile long and 500 yards wide at its mouth, entered from northwestward on the northwestern side of Ostrvo Drvenik Veliki. A small harbor is situated at the village of Drvenik, population about 1,300, at the head of the eastern of two arms of the inlet. A quay, 157 feet long, will accommodate craft drawing up to 8 feet. A light is shown from the head of the quay. Anchorage, in 16 to 22 fathoms, may be taken in the center of the outer part of Luka Drvenik.

Islets in Drvenički Kanal.—Otočić Murvica, 46 feet high, bare and light-colored, lies in mid-channel at the western entrance. It is bordered for about 100 yards northeastward by shallow water.

On the northern side of the fairway of the eastern approach to Drvenički Kanal and in the southwestern approach to Trogirski Zaliv, are a group of islets and above-water rocks, disposed for a distance of about $1\frac{3}{4}$ miles in an east-west direction. Otočić Kluda, the westernmost islet, is 148 feet high, rugged, steep, and in places covered with bushes. Two isolated rocky patches lie midway between Otočić Kluda and Hrid Vinišće; one has a depth of 28 feet, and the other, 33 feet. Hrid Galera lies near the middle of this group of islets.

The summits of Otočić Murvica and Hrid Galera are each marked by a light. A fog signal is sounded at Otočić Murvica.

Directions for Drvenički Kanal.—A vessel entering Drvenički Kanal from westward should pass between Otočić Murvica and Ostrvo Drvenik Mali, whence, the northern shore of Ostrvo Drvenik Veliki should be favored to leave the islets and rocks in the approach to Trogirski Zaliv on her northern side.

Caution.—Vessels bound eastward from this channel must avoid Pličina Mlin (Mačina), described in section 10B-31.

SPLITSKI KANAL

10B-31 General description.—Splitski Kanal, situated between Ostrvo Šolta, on its southern side, and Ostrvo Čiovo with the islets off-lying the southwestern end of that

island, on its northern side, is wide and easily navigated. In the western end of Splitski Kanal between the islets on the northern side of the fairway of the eastern approach to Drvenički Kanal (sec. 10B-30), and the southwestern end of Ostrvo Čiovo are three islets. Otočić Zaporinovac, 20 feet high, is the westernmost of these islets; vessels should pass southward and westward of the group.

On the southern side of the channel, Uvala Rogač is the eastern of two coves entered between Rt Bad, $4\frac{3}{4}$ miles eastward of Rt Obinuš, and a point about $\frac{1}{2}$ mile west-northwestward. Two small moles in the cove will accomodate small craft.

Uvala Nečujam is entered about 1 mile east-southeastward of Uvala Rogač and has the only anchorage for medium size vessels in Ostrvo Šolta. Vessels can anchor in the middle of the bay in 9 to 15 fathoms over good holding ground.

Danger.—Pličina Mlin (Mačina), an isolated reef with a depth of less than 1 foot, is the only danger in Splitski Kanal. It lies nearly in the middle of the western part, $2\frac{2}{3}$ miles eastward of the eastern side of Ostrvo Drvenik Veliki, and is steep-to. A small patch with a depth of 6 fathoms lies $\frac{1}{2}$ mile west-northwestward of the reef. The reef is marked by a beacon.

Mariners are cautioned that this beacon is difficult to sight in any weather and is liable to be washed away.

Directions for clearing Pličina Mlin (Mačina).—When the passage between Otočić Orud (sec. 10B-27), and Ostrvo Drvenik Veliki is open and clear of Rt Novica, a ship is clear southward of the reef. When the summit of Otočić Arkenđel (sec. 10B-28) is visible clear of the northeastern shore of Ostrvo Drvenik Veliki, a ship is northward of the reef.

Lights.—On the southern side of Splitski Kanal, Rt Bad, the eastern entrance point of Uvala Rogač, is marked by a light. Hrid

Galera (sec. 10B-30), to westward, and the eastern entrance point of Uvala Stomorska (sec. 10B-24), to southeastward, are each marked by a light.

TROGIRSKI ZALIV

10B-32 General description.—Trogirski Zaliv lies on the northwestern side of Splitski Kanal and leads westward to Marinski Zaliv and eastward to Zaliv Saldum. It is entered between Rt Jelinak (sec. 10B-29), and Rt Okrug, the western extremity of Ostrvo Čiovo, $1\frac{1}{4}$ miles eastward. The islets and rocks in the southern approach to Trogirski Zaliv are described in 10B-30 and 31. Rt Okrug is bordered by shallow water for a distance of 300 yards westward.

Otočići Čelice lie just within the entrance about $\frac{1}{2}$ mile northwestward of Rt Okrug. Both are bare and of light color; the western one is 36 feet high and is the larger. Detached reefs with depths of 2 to 5 fathoms lie within a distance of 800 yards northwestward, northward, and east-northeastward of these islets. The steeples of the cathedral and Sveti Mihovil church in Trogir (sec. 10B-34), in range bearing 065° – 245° leads safely between Rt Okrug and Otočići Čelice.

Otočići Čelice Light is shown from the summit of the western islet.

Marinski Zaliv is the western arm of Trogirski Zaliv and is entered between Rt Jelinak and Rt Vranjica, $\frac{3}{4}$ mile northward. The bay is completely sheltered by high land which rises to a height of 938 feet westward of Rt Jelinak.

Luka Marina lies at the head of the bay toward which the depths gradually decrease. In the small harbor northward of the village of Marina there is a quay, 150 feet long with an alongside depth of about 7 feet.

Lights.—Pasji Rat, situated on the southern side of Marinski Zaliv, $\frac{3}{4}$ mile eastward of Luka Marina, is marked by a light.

The western corner of the quay at Luka Marina is marked by a light.

Anchorage.—Large vessels can anchor in the middle of Marinski Zaliv in 9 to 21 fathoms.

Zaliv Saldun is situated at the southeastern end of Trogirski Zaliv and is entered between Rt Okrug and Rt Čubrijan, the northwestern extremity of Ostrvo Čiovo, $1\frac{3}{4}$ miles northeastward.

Pilotage is compulsory for Zaliv Saldun and Trogir. Pilots will board vessels southward of Otocio Galera light structure day and night.

Rt Čubrijan is marked by a light.

Large vessels can anchor in the middle of Zaliv Saldun in 16 fathoms over sand and mud with Rt Čubrijan bearing about 346° , distant $\frac{1}{2}$ mile. Several mooring buoys are located in the eastern end of the bay.

TROGIRSKI KANAL

10B-33 General description.—Trogirski Kanal, connecting Trogirski Zaliv to Kaštelanski Zaliv, 10B-45, is situated between Ostrvo Čiovo and the mainland northward. The channel between Rt Čubrijan and Divulje is about $2\frac{1}{2}$ miles long. An island on which stands the town of Trogir is located on the northern side of the middle of the channel forming a narrows about 90 yards wide. The channel is accessible to vessels with drafts of up to 18 feet. The channel is spanned at Trogir by a swing bridge, which provides an opening of about 80 feet. With the exception of Seget and Trogir the shores of Trogirski Kanal are bordered by shallow water. In daylight, watchmen open the bridge when they see a vessel heading for the narrow. Vessels

arriving from westward should give a signal on their siren. At night, the port authorities should be notified of the vessel's arrival, as there are no night-duty watchmen.

The normal current in Trogirski Kanal is west-going. Its velocity is variable but may reach 3 knots.

Aids to navigation.—The northern side of the fairway eastward of the swing bridge is marked as follows: a light buoy showing a flashing white light is moored $\frac{3}{4}$ mile eastward of the bridge; a light buoy showing a flashing green light is moored 300 yards

eastward of the bridge; and a black conical buoy surmounted by a cone is moored midway between the two light buoys. The southern side of the fairway eastward of the bridge is marked by three red can buoys.

The northern side of the fairway westward of the bridge is marked by a red can buoy.

Anchorage.—Vessels can anchor near the fairway of Trogirski Kanal about 400 yards east-northeastward of Rt Čubrijan in 5 fathoms.

Prohibited areas.—Anchoring is prohibited in the vicinity of a submarine cable crossing close westward of the bridge at Trogir. The shore ends of this cable are marked by a board with an anchor painted thereon. Two can buoys are in this area; mooring to them is prohibited. Anchoring is prohibited also within 25 yards eastward of the bridge.

Vessels are prohibited from entering the eastern approach to Trogirski Kanal westward of a line, situated about 0.9 mile eastward of Divulje, which is about 2 miles eastward of Trogir, when a signal of 2 red balls by day and 2 red lights by night, vertically disposed, are displayed at Divulje. See section 10B-54. Navigation is prohibited at all times inshore of a position 850 yards northward of Manasteri Sveti Križ, located about $2\frac{3}{8}$ miles eastward of Rt Čubrijan.

10B-34 Luka Trogir ($43^\circ 31' N.$, $16^\circ 15' E.$).—The southern side of the town of Trogir is quayed for about 1,100 feet and has an alongside depth of about 11 feet. Ostrvo Čiovo on the southern side of the channel opposite Trogir is quayed for about 780 feet but has alongside depths for small craft only. The town of Trogir has a population of about 4,000 and is a port of call for coasters.

Repairs.—A floating drydock with a lifting capacity of 7,000 tons is located at Trogir; portal and floating cranes are available.

Luka Seget, situated about 1 mile westward of Trogir, has a breakwater quayed on its eastern side to which small craft can secure in about 9 feet of water. A protected boat basin is located close northward of the breakwater.

LUKA SPLIT

Position: $43^\circ 30' N.$, $16^\circ 26' E.$

Depths:

Roadstead, 22 to 27 fathoms.

Entrance, 30 to 60 feet.

Inner anchorage, 16 to 34 feet.

Quays, 6 to 29 feet.

Tide: Mean range, 0.5 foot.

Port plan: Section 10B-44.

10B-35 Luka Split is situated at the northwestern end of Brački Kanal on the southern side of a peninsula which terminates at Rt Marjan, 2 miles westward. The harbor consists of a semi-circular basin about $\frac{1}{2}$ mile in diameter formed between Rt Sustipan, a rocky prominence, on its western side, and Rt Bačvice, on its eastern side. Practically the entire harbor is quayed, contains three principal moles, and is protected southward by a breakwater extending westward from Rt Bačvice. The town of Split is situated on the northern and eastern sides of the harbor.

10B-36 Navigation.—The harbor is approached from eastward by Brački Kanal, from southward by Splitska Vrata, and from westward by Splitski Kanal, for the navigation of which the appropriate sections should be consulted.

The dangers lying in the eastern approach between Luka Stobreč and Luka Split are described in sec. 10B-18.

10B-37 Current and wind.—No appreciable current is felt at the entrance or in the harbor.

The bora blows strongly but does not interfere with berthing or maneuvering. The scirocco produces a heavy sea only on the western shore of the harbor. Southerly and southwesterly winds cause seas to wash over the northern quay. Westerly winds cause a heavy swell between Gat 26 Listopada and Gat Sveti Duje.

10B-38 Depths.—In the roadstead southward of the harbor there are depths of 22 to 27 fathoms. About $1\frac{1}{2}$ to 3 miles southeastward of the harbor are depths ranging from $4\frac{1}{2}$ to 23 fathoms. Depths in the entrance are 30 to 60 feet, those in the inner anchorage are 16 to 34 feet, and there are depths of 6 to 28 feet alongside the berths on the eastern side of the harbor.

10B-39 Landmarks.—From a distance the best guides to the harbor are: the level mountain ridge slightly depressed between Vrh Kozjak, 2,559 feet high, and Vrh Sveti

Jure, 2,221 feet high, situated $3\frac{1}{2}$ miles northward of the town; the summit, 584 feet high, of the peninsula lying westward of Split; and the castle at Klis, 5 miles north-eastward of the town. On a vessel's nearer approach, the cathedral, church spires, and buildings of the town are good landmarks. Two lights, close together, are shown from two masts, about 2 miles eastward of the harbor entrance.

10B-40. Anchorages.—The roadstead off Split affords anchorage in depths of 22 to 27 fathoms over good holding mud from 400 to 1,200 yards southward of the eastern breakwater. This anchorage is undesirable during the bora, the one off Luka Poljud, (sec. 10B-53), being then preferred.

There is insufficient room in the inner anchorage for large vessels. Several anchorage berths, 200 yards in diameter, are available in the inner harbor in 16 to 34 feet over mud and shells.

Anchoring is prohibited southeastward of a line joining Rt Sustipan Light and Gat 26 Listopada Light. See port plan.

10B-41 Harbor.—The harbor is entered between the lighthouse, at the head of the mole, off Rt Sustipan, on the western side, and the head of the breakwater that extends about 1,380 feet westward from the eastern side of the harbor, on the eastern side. The inner northern side of the eastern breakwater is quayed, and this section with the three moles and intervening quays, provides the berthing space for light to deep draft vessels.

At the northern side of the harbor there are two basins suitable only for boats.

At the western side of the harbor a 550-foot breakwater extends northward from Rt Sustipan forming a protected basin with general depths of 8 to 20 feet. This basin is entered between reefs through a passage about 50 yards wide and marked by two buoys.

The entire western quay is closely fronted by rocky patches.

A shallow spit with a least depth of 1.8m (6 ft.) extends from the quay between the roots of the eastern breakwater and Gat Sveti Duje.

10B-42 NAVIGATION AIDS.—The following described positions in the harbor are marked by **LIGHTS**: the head of the eastern breakwater, the eastern end of the mole off Rt Sustipan, the head of the breakwater extending northward from Rt Sustipan, the head of Gat Preleterskih Brigada, the southwestern corner of Gat 29 Listopada, and the Seaman Memorial obelisk near the root of the eastern breakwater. A **FOG SIGNAL** is sounded at the eastern breakwater light, there is a signal station.

The eastern extremities of the reefs lying at the entrance to the basin northward of Rt Sustipan are marked by two conical buoys, the northwestern buoy being painted black with a cone topmark and the southeastern buoy painted red with a cylinder topmark; the entrance channel lies between the two buoys and northward of the breakwater.

The shallow spit extending from the quay between the roots of the eastern breakwater and Gat Sveti Duje is marked on its northern side by a black conical buoy surmounted by a cone, and on its southern side by a red can buoy surmounted by a cylinder.

10B-43 PILOTAGE is compulsory for Luka Split and pilots will board vessels off the harbor entrance day and night. The radio call letters for the pilot station are YTFP.

10B-44 FACILITIES.—Luka Split, with the contiguous shipping facilities located at the eastern end of Kastelanski Zaliv consisting of Luka Kastel Sucurac, Luka Sveti Kajo, Luka Vranjic, Lora, and Split's shipyard in Uvala Supaval, ranks second in maritime importance in Yugoslavia, being surpassed only by Rijeka-Susak. Because of the relative smallness of Luka Split and the greater size of the northern harbor at the eastern end of Kastelanski Zaliv, the latter is being developed for ocean-going vessels, thereby relegating Luka Split for chiefly coastwise trade.

The town of Split is situated with suburbs on the northern and eastern sides of the harbor. Its population in 1961 was about 80,000.

BERTHS.—See port plan. Berth dimensions with alongside depths are approximately as follows.

Berth	Length (feet)	Depth
Northern side of breakwater	1,260	6.1m (20 ft.) to 8.8m (29 ft.)
Quay southward of Gat Sveti Duje	650	5.2m (17 ft.) to 5.8m (19 ft.)
Gat Sveti Duje:		
Southern side	560	7m (23 ft.) to 8.8m (29 ft.)
Head	200	8.8m (29 ft.)
Northern side	760	7m (23 ft.) to 8.8m (29 ft.)
Staljinova Obala:		
Southern end	600	6.7m (22 ft.)
Northern end	490	3.9m (13 ft.)
Gat Proleterskih Brigada:		
Southern side	530	6.7m (22 ft.) to 7.9m (26 ft.)
Northern side	530	6.7m (22 ft.) to 7.9m (26 ft.)
Strosmajerova Obala and southern side of Gat 26 Listopada	840	3.9m (13 ft.)

Berths having railway facilities are indicated on the port plan.

There are several powerful tugs in the port. **SUPPLIES.**—Provisions are available. Deck and engine supplies are obtainable. Water is available from hydrants at most of the berths.

REPAIRS of limited extent can be effected at the shipyard at Uvala Supaval where there are drydocks, one of 10,000-ton capacity, floating cranes, and diving equipment.

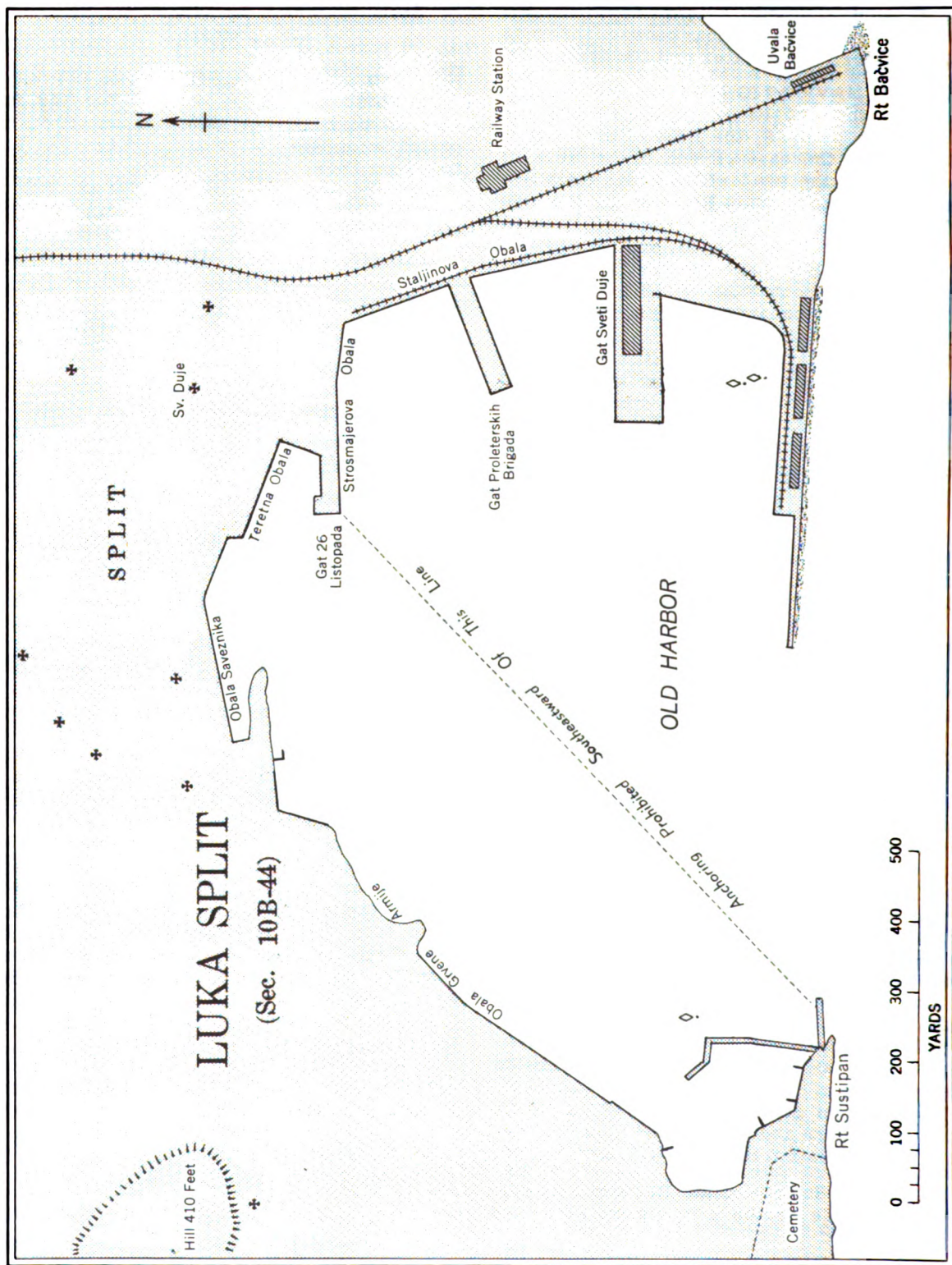
COMMUNICATIONS.—Split is connected by standard gauge railway to Rijeka-Susak and Zagreb via Ogrulin and to the European system at Zagreb. A narrow gauge railway runs from Split to towns in Bosna. Buses to adjacent towns also serve Split. There is frequent steamer service to Adriatic and Mediterranean ports.

HOSPITAL.—The city hospital will examine seamen in the event of injuries.

DERATTING.—Deratting can be carried out, and Deratting Certificates and Deratting Exemption Certificates issued.

KASTELANSKI ZALIV

10B-45 GENERAL DESCRIPTION.—Kas-



telanski Zaliv is a landlocked bay, about 7 miles long and with a greatest breadth of about 3 miles, formed between the peninsula extending westward from Split, on its southeastern side, and Ostrvo Ciovo, on its southwestern side. The northern shore is backed by high land. The bay is entered between Rt Marjan (43°30'N., 16°23'E.) and Rt Jove, the eastern extremity of Ostrvo Ciovo, about 1 1/4 miles southward. Trogirski Kanal, at the western end of Kastelanski Zaliv, leads into Trogirski Zaliv. The eastern and southeastern sides of Kastelanski Zaliv are indented by four coves wherein are situated the principal shipping facilities of the Split area.

The village of Solin, which is served by the Split-Zagreb railway, is situated near the head of Luka Solin, the northeasternmost of the four coves, and stands on the ruins of the ancient Roman city of Salona. Rijeka Jadro, navigable only by boats, empties into Luka Solin.

The artificial harbor of Lora is about 600 yards northeastward of Rt Rat.

10B-46 PILOTAGE is compulsory for Kastelanski Zaliv and for the ports therein. Pilots board vessels off the entrance to Luka Split, day and night. During strong southwesterly winds, pilots board vessels off a point about 1 mile westward of Rt Jove. For service from Splitaska Vrata, see section 10B-43.

10B-47 NAVIGATION AIDS AT ENTRANCE.—A LIGHT is shown from the head of a short breakwater which extends westward from Rt Marjan, near the building of the Oceanographic Institute. A LIGHT BUOY is moored close northward of the breakwater head.

10B-48 ASPECTS, DANGERS, AND NAVIGATION, AIDS.—The northwestern shore between Trogir and Kastel Novi, 4 miles east-northeastward, is low and is fronted by shallow water for nearly 1/2 mile in places.

A LIGHT is shown about 2 1/2 miles west-northwestward of Rt Jove.

A REEF, about 1/2 mile long on which there is a least depth of 6.4m (21 ft), lies 3 1/4 miles northwestward of Rt Jove and about 3/4 mile offshore of Ostrvo Ciovo.

Hrid Skoljic, a rock, 6 feet high, lies about 400 yards westward of Rt Rat, the northern entrance point of Luka Poljud, about 1 3/4 miles northeastward of Rt Marjan. A shallow spit extends about 1/2 mile southwestward from Rt Rat with a depth of 1.8m (6 ft.) at its extremity which is marked on its western side by a pole beacon surmounted by a ball.

A small bay, close northward of Rt Rat, is protected by two breakwaters. A LIGHT is shown from the head of each breakwater. There are several mooring buoys in the bay.

Hrid Galija, 6 feet high, lies 1,200 yards northward of Rt Rat. A LIGHT is shown on Hrid Galija. A light buoy is located about 1/2 mile westward from this light. Two lights are shown about 1/2 mile southward of Rt Rat. Greben Glija lies 440 yards westward of Hrid Galija and is marked by a stone beacon with a cone topmark. Plicina Glija, with a least depth of 3.6m (12 ft), lies 400 yards southwestward of the beacon on Greben Galija.

Hrid Silo, with a depth of 2.7m (9 ft.) lies 1/2 mile eastward of Hrid Galija and is marked by a light. There is a detached 7.3m (4 fm) patch midway between Hrid Silo and Rt Rat.

Otocic Barbarinac, 26 feet high and tree-covered, lies on a reef extending 1/4 mile off the western end of the northern side of Luka Solin. A depth of 9.8m (5 1/4 fm) lies about 1/3 mile westward of Otocid Barbarinac. Four small islets lie 600 yards eastward of Otocic Barbarinac. A detached 6.1m (20 ft.) patch, about 800 yards eastward of Otocid Barbarinac, is marked by a white can light buoy. A black can light buoy is moored about 400 yards northward of Rt Marjan. Navigation is prohibited between this light buoy and the shore. A light is shown about 150 yards southwestward of Otocic Barbarinac. A light is shown from a point 800 yards south-southeastward of Otocic Barbarinac.

The points of the four coves, previously mentioned, are fronted by rocks or shallow water for a distance of 300 yards in places.

10B-49 FACILITIES IN KASTELANSKI ZALIV (Split Northern Harbor)—KASTEL

SUCURAC.—At the cement works, situated on the northeastern shore 1/4 mile northwestward of Otocic Barbarinac and about 3/4 mile southeastward of the village of Sucurac, there is a wharf, 975 feet long with 10.6m (35 ft.) alongside.

10B-50 SVETI KAJO (Solin) is situated on the northern side of Luka Solin, about 1 mile eastward of the wharf at Kastel Sucurac. Sveti Kajo has the following berthing areas from west to east: Jugonafra Quay has 1,000 feet of berthing with 9.1m (30 ft.) alongside; Brodospos Pier has 1,100 feet of berthing with 8.8m (29 ft.) alongside; Dalmatia Quay has 900 feet of berthing with 9.1m (30 ft.) to 14.9m (49 ft.) alongside; Ilcev Wharf has 300 feet of berthing with 9.1m (30 ft.) to 14.9m (49 ft.) alongside; and Jugopetrov Pier has 150 feet of berthing with 7.9m (26 ft.) alongside.

10B-51 LUKA VRANJIC is situated on the southern side of the peninsula dividing the easternmost bay of Kastelanski Zaliv into two coves. Madjam Quay, on the southern side of the peninsula, has a berthing length of 830 feet with 8.8m (29 ft.) to 12.8m (42 ft.) alongside. Vranjic Quay, close eastward of Madjam Quay, has a berthing length of 500 feet with 10m (33 ft.) to 12.8m (42 ft.) alongside. New Cargo Quay, on the southern side of Luka Vranjic, has a berthing length of 2,950 feet with 8.8m (29 ft.) to 12.8m (42 ft.) alongside.

10B-52 UVALA SUPAVAL, situated on the southeastern shore, 1 mile westward of Luka Vranjic, contains a shipyard with several shipbuilding ways and floating drydocks, in the eastern cove of the bay. The dimensions of the largest floating drydock are as follows: length on bottom, 348.4 feet; breadth at entrance, 82 feet; depth on sill, 8m (26.2 ft.); lifting capacity, 7,000 tons. A 60-ton floating crane and two 5-ton cranes are available.

Lora, located westward of Uvala Supaval, is a naval port.

Railroad connections are available.

10B-53 LUKA POLJUD, situated on the southern side of Rt Rat and previously mentioned, is the quarantine anchorage of Luka Split. On the southeastern side of Luka Poljud

is a small harbor sheltered by two piers.

10B-54 LESSER PORTS.—There are several villages on the northern side of Kastelanski Zaliv which have either artificial harbors or quays for small vessels or craft. Divulje, a seaplane base, is situated at the northeastern entrance point of Trogirski Kanal.

Beginning at a position 2 1/4 miles northeastward of Divulje, the villages of Kastel Novi, Kastel Stari, Kastel Luksic, Kastel Kambelovac, Kastel Gomilica, and Kastel Sucurac stretch eastward for 4 miles.

Luka Slatine is situated on the northeastern side of Ostrovo Ciovo, 2 1/2 miles west-northwestward of Rt Jove. Luka Arbanija lies 1 3/4 miles farther west-northwestward.

10B-55 LIGHTS.—The following described positions in Kastelanski Zaliv are each marked by a light: the western corner of the cement loading wharf at Luka Vranjic, the northwestern corner of the cement works at Sveti Kajo, the southwestern angle of the wharf at the cement works at Kastel Sucurac, the head of the breakwater at Divulje, the head of the breakwater at Luka Slatine, the head of the pier at Kastel Gomilica, and the head of the pier at Luka Arbanija.

BUOYS.—Conical buoys are moored 1/4 mile, 110°, and about 1/4 mile, 243°, respectively, of the breakwater light at Divulje.

10B-56 ANCHORAGES.—Vessels can anchor anywhere in Kastelanski Zaliv over good holding ground, except over the rocky patches situated southward of Kastel Novi, southward of a position midway between Kastel Luksic and Kastel Kambelovac, and the reef off Ostrovo Ciovo, previously mentioned. The recommended anchorages for large vessels are situated 1/2 mile south-southwestward of Kastel Kambelovac in 21.9m (12 fm), and 3/4 mile westward of Rt Rat in 28m (15 fm) to 33m (18 fm) over a mud bottom; anchorage for small vessels can be had off the pier of Luka Poljud in a 7.3m (4 fm) over a sandy bottom.

A submarine cable extends northwestward from the northwest point of Rt Rabat to Rt Giricic.

Anchoring is also PROHIBITED in the entrance to Uvala Supaval southward of a line drawn from Hrid Silo to the eastern entrance point. See section 10B-33.

The description of the coast northward of Rt Ploca (sec. 10B-28), is continued in chapter 11.

ANCHORAGES

10B-57 LUKA MAKARSKA.—Section 10B-6.

HVARSKI KANAL.

STARIGRADSKI ZALIV.—Section 10B-10.

LUKA VRBOSKA.—Section 10B-11.

LUKA JELSA.—Section 10B-11.

LUKA BOL.—Section 10B-12.

LUKA SUMARTIN.—Section 10B-12.

BRACKI KANAL.

SIDRISTE OMIS.—Section 10B-15.

LUKA SUPETAR.—Section 10B-17.

LUKA SUTIVAN.—Section 10B-17.

LUKA MILNA.—Section 10B-24.

UVALA STARI TROGIR.—Section 10B-28.

DEVENICKI KANAL.

LUKA VINISCE.—Section 10B-30.

LUKA DEVENIK.—Section 10B-30.

SPLITSKI KANAL.

UVALA NECUJAM.—Section 10B-31.

MARINSKI ZALIV.—Section 10B-32.

ZALIV SALDUN.—Section 10B-32.

TROGIRSKI KANAL.—Section 10B-33.

LUKA SPLIT.—Section 10B-40.

KASTELANSKI ZALIV.—Section 10B-56.

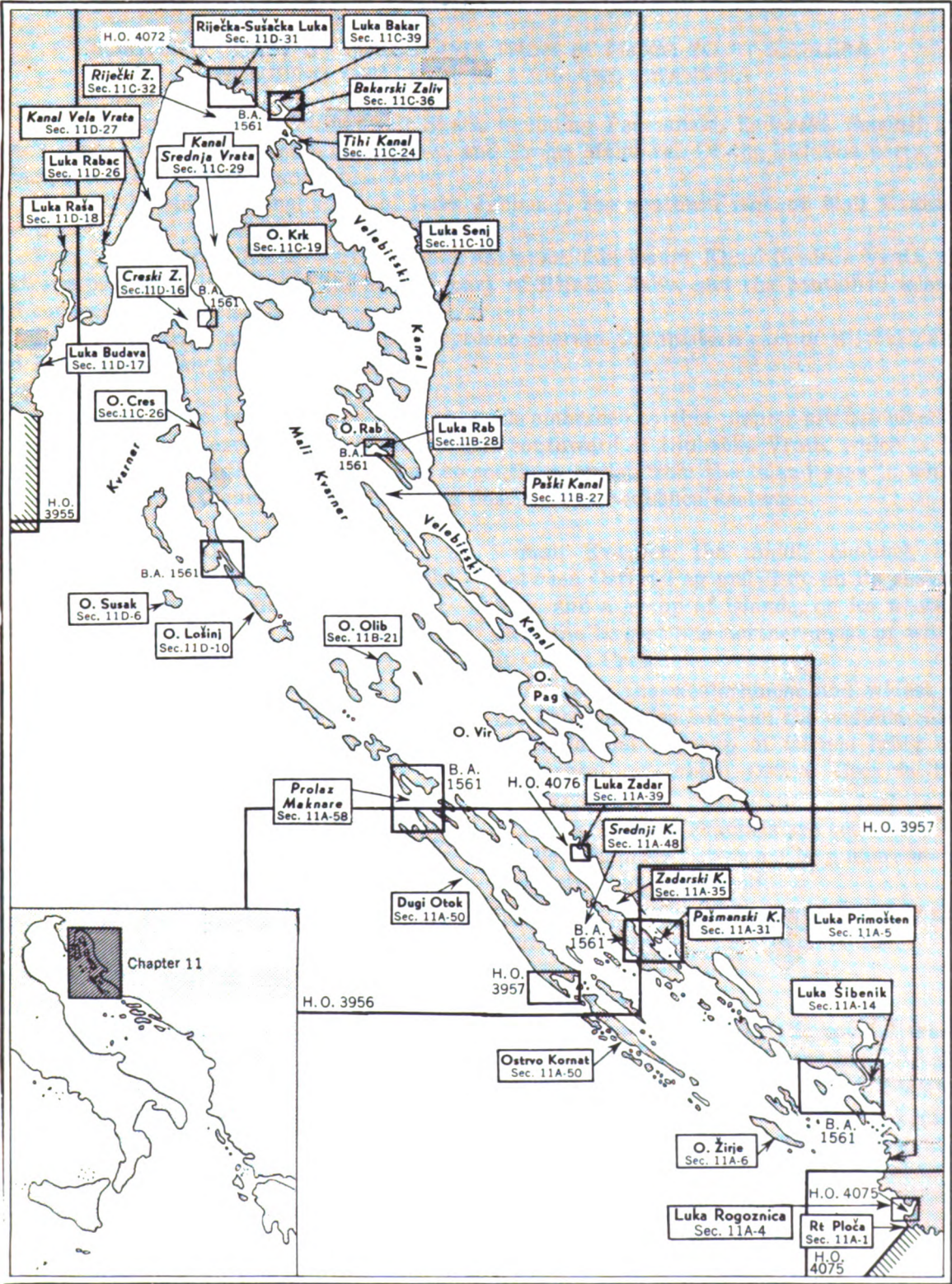


Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Navy Hydrographic Office.
Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 11—GRAPHIC INDEX

CHAPTER 11

NORTHERN COAST OF YUGOSLAVIA FROM RT PLOČA TO RT MARLERA, INCLUDING OFF-LYING ISLANDS AND CHANNELS

Part A. Coast from Rt Ploča to Rt Skala, including Pašmanski, Zadarski, Srednji and lesser channels and their bounding islands, and Prolaz Maknare. Of the included ports, the principal are Luka Šibenik and Luka Zadar.

Part B. Velebitski Kanal south of Luka Jablanac, the southern part of Mali Kvarner, and the contained islands and connecting channels.

Part C. Velebitski Kanal, north of Luka Jablanac, Tihi Kanal, Kanal Srednja Vrata, the northern part of Mali Kvarner, the eastern part of Riječki Zaliv, and the contained islands and connecting channels.

Part D. Kvarner and islands in the approach thereto, the western part of Riječki Zaliv, and Riječka-Sušačka Luka.

Plan.—The coast, islands, and coastal channels embraced by this chapter are described in sequence northward, except for Velebitski Kanal southward of Ljubačka Vrata, which is described in sequence southward, there being no southern outlet from the inland seas to which this channel leads. Connecting channels are described in sequence eastward.

GENERAL REMARKS

11-1 The coastline and islands within the area embraced by this chapter are universally bold, high, and for the most part steep-to. Deep water is found everywhere a short distance offshore.

The coast of the southern part of this area has numerous indentations affording good anchorage, with many off-lying islands and rocks.

The islands of this entire area differ in their orientation from those southward of Rt Ploča, in that their axes lie in a north-northwest and south-southeast direction.

The waters of the northern area described in this chapter are known as the Gulf of Quarnaro. This gulf is divided into three main channels.

Velebitski (Planinski) Kanal, the easternmost, narrowest, and longest, lies between the coast of Yugoslavia and a number of islands, the largest of which are Pag, Rab, and Krk.

Mali Kvarner, the middle channel, lies between Ostrvi Pag and Rab, on its eastern side, and a group of islands, on its western side, the largest and northernmost of which is Ostrvo Cres.

Kvarner, the westernmost and widest of the channels, lies between the eastern coast of Istria and a group of islands lying off that coast, of which Ostrvo Cres is the northernmost.

The three main channels are connected by smaller channels between the numerous islands situated in the gulf.

Riječka Zaliv is situated at the head of the Gulf of Quarnaro.

NAVIGATION

11-2 The eastern Adriatic coastal track from a midchannel position in Biševski Kanal is $31\frac{1}{2}^{\circ}$ for a distance of 140 miles to Pličina Albanež (Secca Pericolosa) Light-house. This track clears all dangers, and

approaches land closest in a position 3 miles southwestward of Ostrvo Susak.

The principal navigation lights, two of which will be visible from this track simultaneously for cross bearings, are situated on: Otočić Blitvenica (sec. 11A-6), Otočići Sestrice (sec. 11A-56), Veli Rat (sec. 11A-58), Otočić Kamenjak (sec. 11B-18), Otočić Grujica (sec. 11B-19), Ostrvo Susak (11D-1), Hrid šilo (sec. 11D-7), and Ostrvo Unije (sec. 11D-8).

CURRENT AND WIND

11-3 Current.—The axis of the northwesterly coastal current, which has a normal velocity between 0.4 and 0.5 knot, lies approximately 9 miles off Dugi Otok and Ostrvo Kornat. In a position southwestward of Ostrvo Premuda, the coastal current forks into two branches, one entering Kvarner between Ostrvo Unije and Ostrvo Lošinj, and the other continuing along the western coast of Istria.

Wind.—The wind and weather conditions characteristic of the upper Adriatic prevail over the southern part of the area covered by this chapter. The wind and weather in the Gulf of Quarnaro have a generally common pattern but there are wide local variations, and these variations will be described in the appropriate parts of this chapter.

PART A. RT PLOČA TO RT SKALA, INCLUDING OFF-LYING ISLANDS AND CHANNELS

11A-1 Rt Ploča ($43^{\circ}30' N.$, $15^{\circ}58' E.$), situated 20 miles westward of Split, is a steep point consisting of whitish rock on which stand a white chapel and the ruins of a house. A rock almost awash lies close off the point. A hill, 407 feet high, located $\frac{3}{4}$ mile north-northwestward, is prominent from a distance because of its light color.

GENERAL FEATURES

11A-2 Between Rt Ploča and Rt Skala, 56 miles northwestward, the mainland coast has numerous indentations providing good anchorage, with many off-lying islands and rocks. The mountains backing this coast are precipitous and bare for the most part, with their seaward bases cultivated.

Dugi Otok and Ostrvo Kornat, both narrow and long, are the outermost islands along this stretch of coast, lying about 11 miles offshore. Numerous islets and rocks lie eastward of the southern end of Dugi Otok and southeastward of Ostrvo Kornat.

Between the mainland and the outermost islands are several channels providing inland routes between Rt Ploča and Luka Šibenik to southward and Luka Zada and Mali Kvarner to northward. Of these, the two most important ones are Srednji Kanal and Pašmanski-Zadarski Kanal. The more easily navigated and deeper channel is Srednji Kanal lying between the islands adjacent northeastward of Dugi Otok and Ostrvo Kornat, to southwestward, and Ostrvi Pašman and Ugljan, to northeastward.

Pašmanski-Zadarski Kanal separates the latter two islands and the mainland, and although it has two rather difficult passages in its narrows, it is the more often used channel, chiefly because a larger number of ports lie along its shores than exist in Srednji.

OFF-LYING DANGERS

11A-3 Between Rt Ploča and Otočići Sestrice, 40 miles northwestward, lie many islets and dangerous rocks. No dangers lie seaward of a line bearing 124° – 304° joining a position $\frac{1}{4}$ mile southward of Rt Ploča and Hrid Mulo Lighthouse, section 11A-4, $2\frac{1}{2}$ miles northwestward, and seaward of a line bearing 114° – 294° joining Hrid Mulo Lighthouse and Otočić Blitvenica Lighthouse (sec.

11A-6), 21½ miles northwestward. The dangers lying between Otočići Sestrice and Otočić Blitvenica will be avoided by keeping the lighthouse on the latter islet bearing not greater than 121°.

The southwestern shore of Dugi Otok, between Otočići Sestrice and Veli Rat, the northwestern extremity of Dugi Otok, is steep-to and free of dangers except for a distance of about 2½ miles where there is a bordering shoal on which stands Otočić Mežanj, about 5¾ miles southeastward of Veli Rat Lighthouse and ¾ mile offshore, and Pličina Mišnjak, a 4-fathom patch about 1 mile south-southeastward.

A circular explosives dumping area having a radius of 2 miles is centered about 9 miles southwestward of Otocić Mezanj.

A rectangular artillery and submarine exercise area lies southward of the off-lying islands southward of the Zirjeski Kanal (11A-6). Its northern side extends about 16 miles west-northwestward from a position about ¾ mile southeastward of the southeastern extremity of Ostrvo Zirje (11A-6). The eastern and western sides extend southward about 10 miles.

LANDMARKS—COASTAL FEATURES

11A-4 The coast between Rt Ploča and Rt Oštrica Vela, 9¼ miles north-northwestward, is indented and fronted by islets and some reefs. The headland of which Rt Ploča is the southernmost point extends about 1½ miles westward and terminates in two points of land, Rt Konja being the northern. Uvala Movar is formed in the cove between the two points of land and provides a good anchorage over sand. Two islets lie ½ mile westward of Rt Konja; the least depth in the passage between them and the point is 9½ fathoms. Hrid Kalebinjak, lying close eastward of the larger islet off Uvala Movar, is marked by a light.

Hrid Mulo (43°31' N., 15°55' E.), a rocky islet situated about 1½ miles westward of Rt Konja, is marked by a light.

Pličina Veli Brak with a depth of 2 fathoms lies midway between Rt Konja and Otocić Svilan, 3 miles northwestward, and is marked by a buoy. This buoy is often swept away by the sea.

A detached rocky bank with 5 1/2 fathoms over it lies about 1 1/2 miles northwestward of Otocić Svilan.

Luka Rogoznica (43°31' N., 15°58' E.) is an inlet, surrounded by barren hills, entered between Rt Konja, on its southern side, and Rt Gradina, about ½ mile northeastward. A lighthouse and a conspicuous chapel stands on Rt Gradina. The harbor is divided into two parts by an island, 233 feet high, on the northwestern end of which is located the village of Rogoznica. Conspicuous in the village are the church belfry and a mill tower. There are depths of 6 1/2 to 11 feet alongside the quay fronting the village. The island is connected northward to the mainland by a causeway. The eastern part of the harbor, about 1 1/2 miles long in a north-south direction and between 400 and 1,000 yards wide. Anchorage may be taken, in 13 to 17 fathoms poor holding, off the northeastern coast of the island. Anchorage, in 11 to 12 fathoms may be taken westward of the village. This harbor is free of dangers except for a short bordering shoal at the shoreline and a rocky spit extending about 400 yards north-northwestward from the eastern entrance point of a cove on the southern shore. A dangerous wreck lies near the southeastern point of the above island. In the smaller western part of the harbor, vessels anchor and secure their sterns to bollards northwestward of the quay, on a southwest-northeast heading. A charted prohibited anchorage area exists within this harbor. A submarine cable is laid from near the southwestern side of Ostrvo Rogoznica and extends in a westerly direction, rounding Rt Konja, thence in a southwesterly direction to near the middle of the eastern shore of Oi Smokvica lying close westward of Rt Konja.

A cove indents the southern side of Luka Rogoznica; a light is shown on the eastern shore of this cove.

Rt Gradina and the quay at the village are each marked by a light.

Directions for entering Luka Rogoznica.—Vessels approaching from southward may pass on either side of Hrid Mulo and should not approach the northwestern side of the smaller islet westward of Rt Konja closer than 700 yards. The southern extremity of the island in Luka Rogoznica in range with

Rt Gradina, bearing about 109°, leads clear northeastward of Pličina Veli Brak, and the northern extremity of Rt Konja in range with the northern extremity of the smaller islet off the point, bearing about 097°, leads clear southward of it. Hrid Mulo in range with Rt Kremik, $3\frac{1}{2}$ miles northward, bearing about 358°, leads clear eastward of the reef. The shores of the entrance to Luka Rogoznica may be approached safely to a distance of 100 yards.

Uvala Ložica, a bay about 1 mile wide, is entered between the peninsula of Rt Gradina and Otočić Šimun, 1 mile northwestward, a conical steep light brown-colored islet, 131 feet high, which is connected to the mainland by a shallow reef. A small islet obstructs the southeastern entrance. Anchorage is not recommended because of rock and gravel bottom.

Luka Peleš, $1\frac{1}{4}$ miles northward of Otočić Šimun, is an inlet about $\frac{1}{2}$ mile long entered between Rt Zečovo, on its southern side, and a peninsula, 558 feet high, on its northern side. The peninsula terminates westward at Rt Kremik which is marked by a light. Anchorage is prohibited in Luka Peleš.

11A-5 Luka Primošten ($43^{\circ}35' N.$, $15^{\circ}55' E.$) is entered between Rt Kremik and Rt Sela, about $\frac{1}{2}$ mile north-northeastward, the southern extremity of a small peninsula on which is situated the village of Primošten, population about 4,000. A short quayed breakwater where shallow draft vessels may secure extends eastward from the village. The head of the breakwater is marked by a light. Anchorage in from 3 to 20 fathoms over good holding sand and weed may be taken anywhere at a distance greater than 150 yards offshore.

Otocic Smokvica lies close north-northwestward of Luka Primošten. The light-colored islet is overgrown with low bushes and is connected to the mainland by a shallow spit.

Off-lying islets and reefs.—Four islets and three reefs lie within a distance of 2 miles westward and southwestward of Rt Kremik Lighthouse. Greben Grbavac over which is a depth less than 6 feet lies 1.7 miles southwestward of Rt Kremik Lighthouse and is marked by a beacon. A reef with a depth of $13\frac{1}{2}$ feet and marked by a light lies 0.4 mile southeastward of Otocic Maslinovik which is located 0.5 mile westward of Rt Kremik Lighthouse. The passage between the islet and the point is used by vessels with local knowledge bound for Luka Primošten, the mainland shore being favored to avoid the reef in the fairway. The islets and reefs will be avoided by keeping Rt Kremik Lighthouse bearing less than 015° and greater than 098°.

The coast between Primošten and Rt Bilo, 3 miles northward, consists of several coves and is steep-to. There are three off-lying islands, Otočić Tmara, 105 feet high and bare on its western side, is the largest and lies close westward of Rt Bilo. A rocky shoal with a depth of 23 feet over it lies close southward of the southwestern end of Otocic Tmara. A 9-fathom patch lies about $\frac{1}{4}$ mile northwestward of Otocic Tmara.

Luka Grebaštica, about $2\frac{1}{2}$ miles long, is entered between Rt Bilo and Rt Oštrica Vela, about 1 mile northwestward, the western extremity of a peninsula rising to a summit, 308 feet high about 1 mile eastward of the point, near which is a long ancient wall. The village of Grebaštica lies at the head of the inlet and a prominent chapel stands on Rt Oštrica Vela.

A light is shown on Rt Oštrica Vela. Another light is shown on the southeastern extremity of Otocic Krbela, a small island about $\frac{3}{5}$ mile northeastward of Rt Oštrica Vela.

There is an anchorage for large vessels in 16 to 32 fathoms over good holding sand and weed south-southeastward of the summit on the northern shore. The bora in Luka Grebastica is relatively moderate, but the scirocco may become violent.

ZIRJEVSKI KANAL

11A-6 Žirjevski Kanal is the southwesternmost of four leading between the islets southeastward of Ostrvo Kornat, mentioned in section 11A-2, from the vicinity of Rt Ploča toward Srednji and Pašmanski-Zadarski Kanal, which in turn serve Luka Zadar and Mali Kvarner.

Žirjevski Kanal is entered from southeastward between Ostrvo Žirje, on its southwestern side, and Ostrvo Kakan and numerous islets off-lying the latter, on its northeastern side. Otočić Hrbošnjak ($43^{\circ}39' N.$, $15^{\circ}44' E.$), 72 feet high, lies in the middle of the southeastern entrance, about 9 miles northwestward of Rt Kremik (sec. 11A-4). The islet's southwestern side is marked by a light. Otocić Ravan, an islet 66 feet high, about one mile northward of Otocić Hrbošnjak, is marked on its western end by a light. The channel has a minimum width of 1 mile with a least depth in the fairway of about 36 fathoms.

A rock lies close off the southeastern extremity of Otocić Žirje.

The northern shore of Ostrvo Žirje is steep, bare and light-colored, whereas the slopes of the southeastern part are scrub-covered. The island consists of two chains of hills separated by a valley which when viewed afar from northwestward appear as two islands. The shoreline is indented with a few coves providing anchorage for small craft. There are several close off-lying islets and reefs. Brak od Prašćica, a rock with less than 6 feet of water, lies about 600 yards offshore of a position about $1\frac{3}{4}$ miles east-southeastward of Rt Žirja, the northwestern extremity of Ostrvo Žirje. It is marked on its northern side by a light. Luka Muna, about $2\frac{1}{2}$ miles east-southeastward of Rt Žirja, offers shelter to small vessels in its inner part from all winds with the exception of the bora and northerly winds. At the village of Muna are two piers, connected by a quay, which are suitable for small vessels. Anchorage is in depths of 5 to 6 fathoms, sand. Anchorage is prohibited in Uvali Koromasnoj, close northwestward of Luka Muna.

A light is shown from a red metal tower, 18 feet high, on Rt Muna, the eastern entrance point of Luka Muna.

The shores of Ostrvo Kakan on the northern side of the channel and of the adjacent islets are everywhere rocky, the hills covered with bush and the valleys cultivated. A light is shown on Rt Kakan, the southeastern extremity of the island. Anchorage is prohibited in Uvala Tratica, which lies south-southeastward of Rt Ostrica (sec. 11A-7). Otocić Mrtovnjak, an islet 134 feet high, about $3\frac{1}{2}$ miles west northwestward of Rt Žirja, is marked by a light on the northerly point.

Directions.—Vessels proceeding northwestward should approach Otočić Hrbošnjak on that heading, and after passing the islet, steer on the range of the islet and the summit of Rt Kremik bearing 118° – 298° . This course should be maintained until past and clear of Plićak Čavlin, a dangerous reef with 6 feet of water, whence course may be laid for the northern channels. This reef lies 2 miles northwestward of Otočić Tetevišnjak Veliki, a light yellow-colored conical islet and the largest northwestward of Ostrvo Kakan. A 33-foot patch lies about $\frac{1}{2}$ mile south-southeastward of this reef.

A vessel proceeding to the northwestern end of Žirjevski Kanal from seaward and southwestward of Rt Žirja, should close Otočić Blitvenica ($43^{\circ}38' N.$, $15^{\circ}35' E.$), an islet 98 feet high and situated $3\frac{1}{2}$ miles southwestward of Rt Žirja; it is the outermost of those islets lying off Ostrvo Žirje. A light is shown from the summit of the islet. From a position 0.5 mile, and no farther eastward of Otočić Blitvenica, a course of 350° will lead over a least depth of 11 fathoms for 5.5 miles to the axis of Žirjevski Kanal, passing Otočić Sedlo, 49 feet high, Hrid Bačvica, just above water, and Otočić Samograd, 108 feet high, on the western side, and Otočić Nozdra, 26 feet high, and Otočić Raparašnjak, 52 feet high, on the eastern side.

KAKANSKI KANAL

11A-7 Kakanski Kanal provides the shortest route between Rt Ploča and Pašmanski-Zadarski Kanal. Although it is only about 300 yards wide at the narrows it can be used in daylight by a vessel of any size. The controlling depth is about $8\frac{3}{4}$ fathoms.

A strong current particularly in the southern part prevails in the channel.

The channel lies between Ostrvo Kakan (sec. 11A-6), on its southwestern side, and Ostrvo Kaprije, on its northeastern side. The latter island is rocky in part, falling steeply to the sea in most places and elsewhere overgrown with heavy bush. Its summit rises to 433 feet in the southeastern part and a conspicuous cairn stands on an elevation, 138 feet high, near Rt Kaprije, the northwestern extremity. A light is shown on Lemes Rt, the southeastern extremity of the island.

Two islets lie at the southern entrance, Otočić Kamešnjak Veliki ($43^{\circ}40' N.$, $15^{\circ}42' E.$), 66 feet high, to westward, and Otočić Kamešnjak Mali, 56 feet high, about 400 yards eastward. A shoal, with a depth of less than 10 feet and which is visible sometimes, lies about 550 yards southeastward of the latter islet. Two islets lie on the northwestern side of the channel close off Ostrvo Kakan to which they are attached by a shoal. A detached shoal with a depth of 18 feet is located nearly in midchannel close off Rt Oštrica, a point on the northern shore of Ostrvo Kakan.

The village of Kaprije is situated on the island of the same name at the head of an inlet entered directly northward of the narrows. The quay at the village is marked by a light.

There are several anchorages for small vessels in the coves of Kakanski Kanal.

Directions.—A vessel approaching from southeastward should pass between Otočić Hrbošnjak (sec. 11A-6), to southward, and Otočić Ravan, and steer for the southwestern end of Otočić Kamešnjak Veliki, thence between the two Otočić Kamešnjaci and through the middle of the narrows. When clear of the narrows proceed along the shore of Ostrvo Kaprije, which is steep-to, at a distance of about 200 yards to avoid the 18-foot patch of Rt Oštrica. When abreast Rt Remetic, a point 1 mile south-southeastward of Rt Kaprije, steer for Raduc, the summit of Ostrvo Murter, bearing about 329° , distant $7 \frac{3}{4}$ miles, passing east-

ward of the 14-foot shoal lying $1\frac{3}{4}$ miles eastward of Otočić Tetevišnjak Veliki.

KAPRISKI KANAL

11A-8 Kapriski Kanal is rendered intricate by islets and shoals among which the current sets with considerable velocity, notwithstanding which, it may be used in daylight by a vessel of any size. The channel lies between Ostrvo Kaprije (sec. 11A-7), on its western side, and Ostrvo Zmajan, on its eastern side. The latter island is steep-to and when seen from southward has the appearance of a long hill of which the summit, towards its northwestern end, is 476 feet high. Sir Rt, the southeastern extremity of Ostrvo Zmajan, is marked by a light. The channel has a minimum width of $\frac{1}{2}$ mile and a controlling depth of about 17 fathoms.

It is entered between Otočić Sokol, an islet 52 feet high, located about $2\frac{1}{2}$ miles east-northeastward of Otočić Hrbošnjak (sec. 11A-6), and Otočić Misjak Mali, 151 feet high, about 1 mile westward. Several islets lie on each side of the southern entrance. Pličina Kraljak with a depth of less than 11 feet lies on the southwestern side of the fairway off the southeastern extremity of Ostrvo Kaprije. In the northern part of the channel Otočić Bavljenac, 144 feet high, lies about 1 mile westward of the northern extremity of Ostrvo Zmajan and Otočić Prčevac, 115 feet high, lies close off the northeastern point of Ostrvo Kaprije. Two small islets, Otočići Dupinić, lie between the larger islets.

Directions.—A vessel from southeastward should pass between Otočić Sokol and Otočić Misjak Mali, whence Otočić Prčevac in range with the southern extremity of Otočići Dupinić, bearing 133° – 313° , leads through the narrow portion of the channel northeastward off Pličina Kraljak. Three clear passages are available for leaving the channel, but that between Otočić Bavljenac to eastward and Otočići Dupinić to westward is the widest. A 25-foot shoal lies $\frac{1}{2}$ mile northward of Otočić Bavljenac.

ZLARINSKI KANAL

11A-9 Zlarinski Kanal, which is about $\frac{3}{4}$ mile wide at its narrowest part and has a controlling depth of about 30 fathoms, lies between Ostrvi Zlarin and Tijat to north-eastward, and Ostrvo Zmajan to southwestward. This channel is the best and that most frequented by vessels bound to Luka Zadar or to ports northward from the vicinity of Rt Ploča.

Several islets are disposed between Rt Oštrica Vela (sec. 11A-5) and Rt Rat, the southern extremity of Ostrvo Zlarin, $1\frac{1}{2}$ miles northwestward. Otočić Dvanka ($43^{\circ}39' N.$, $15^{\circ}53' E.$), an islet about 82 feet high, which is the eastern entrance point of the southern entrance to Šibenički Kanal, is marked by a light. Otocic Oblik lies about 500 yards northwestward of Rt Oštrica Vela. A detached reef extends about 400 yards eastward from the islet. The easternmost rock of this reef is marked by a conical beacon. Šibenicki Kanal is the approach to Luka Šibenik and is described in section 11A-10.

Several islets and shoals extend south-eastward from Ostrvo Zmajan, the outermost being Otočić Komorica, 82 feet high and marked on its northeastern side by a light. This islet with Otočić Dvanka forms the southern entrance points to Zlarinski Kanal. Otočić Hrbošnjak Light, westward of the southern approach to Zlarinski Kanal, is mentioned in section 11A-6.

Ostrvo Zlarin is steep-to, partially cultivated at its northern end, and rises to a summit of 558 feet near its southwestern shore at about midlength. A chapel stands on Rt Marin, its northwestern extremity. Zlarinska Luka lies at the head of a cove which indents the north coast of the island. It is exposed to winds from north to northwest which raises a heavy sea in the anchorage. An artificial harbor lies westward of the village and has several good piers for small vessels. The northernmost pier is reserved for local steamers; this pier has a light on its head. Rt Rat, the southern extremity, is marked by a light. A dangerous wreck exists about $\frac{1}{2}$ mile westward of Rt

Marin. Ostrvo Tijat, the eastern entrance point of the northern end of Zlarinski Kanal, is rocky and steep-to on all sides, particularly the northern where it terminates at Rt Kruzic. The highest point on the island is surmounted by an iron cross. This point is the southern entrance point of the northern passage to Šibenicki Kanal. Rt Tijascica, the southeastern extremity of Ostrvo Tijat is marked by a light. Plicina Roženik (sec. 11A-10) which lies in the middle passage to Šibenicki Kanal, midway between Ostrvo Zlarin and Otocic Lupac, 1 mile northwestward, is also marked by a light.

Pličina Sestre with a depth of 15 feet lies in the fairway of Zlarinski Kanal about 1 mile south-southwestward of Rt Mariu. A light, shown from a white 18-foot metal tower, marks the shoal.

Directions.—A vessel approaching from southward or eastward should enter Zlarinski Kanal midway between Otočić Komorica and Otočić Dvanka, thence between Pličina Sestre and Ostrvo Zlarin, closing the coast of the latter to a distance of 600 yards or less, and keeping that distance from it until Pličina Roženik Lighthouse bears about 031° , and is well open northwestward of Rt Marin. From the latter position, a vessel should haul westward and proceed in midchannel between Ostrvi Zmajan and Tijat.

**APPROACHES TO ŠIBENIK—
ŠIBENIČKI KANAL**

11A-10 Šibenički Kanal lies between Ostrvi Zlarin and Prvić with adjacent islets, on its southwestern side, and the mainland, on its northeastern side. Kanal Sveti Ante, the entrance to Luka Šibenik, opens through the mainland at about midlength of Šibenički Kanal. The latter channel has a minimum width of about $\frac{1}{2}$ mile though the passages into it are more constricted. The depths in the fairway are from 6 to 25 fathoms but there are numerous bordering shoals of much lesser depth.

There are three passages into Šibenički Kanal. The southernmost which is deep and

lies between Ostrvo Zlarin and the mainland, southeastward, is the best and the most used. The middle passage lies between Ostrvo Zlarin and Ostrvo Prvić, about $1\frac{1}{2}$ miles northwestward. The northern passage lies between Ostrvo Prvić and the mainland northwestward.

Southern part of Šibenički Kanal.—The best passage to the southern part of Šibenički Kanal is the narrow deep one, about 600 yards wide, between Ostrvo Zlarin, on its western side, and Otočić Dvanka ($43^{\circ}39' N.$, $15^{\circ}53' E.$) (sec. 11A-9) and Drvenik, on its eastern side. Otočić Drvenik is marked by a light. The northeastern side of Ostrvo Zlarin is steep-to and that side of the channel should be favored for the deepest water. Otočić Krapanj, a cultivated islet 23 feet high, situated at the southeastern end of the channel, has a bordering shoal which extends nearly 1 mile northwestward and is marked at its extremity by two stone pyramidal beacons. The small craft harbor of the village of Krapanj is located on the southeastern side of Otočić Krapanj; the head of the mole is marked by a light. Fronting Rt Grmine, $\frac{3}{4}$ mile northwestward of the beacons, are several shoals with less than 6 feet of water.

Middle passage into Šibenički Kanal.—This passage is entered between Pličina Roženik (sec. 11A-9), $\frac{3}{4}$ mile north-northeastward of Rt Marin, on its southern side, and Otočić Lupac, on its northern side. A light is shown on the southeastern extremity of Otočić Lupac. Pličina Roženik, which dries, is marked on its northern side by a black conical buoy. Between this rock and the northern point of Ostrvo Zlarin is a rocky patch with a depth of 11 feet and which is marked on its eastern side by a red conical buoy. Hrid Galijola, about 6 feet high, lies on the northern side of the passage close westward of Otočić Lupac.

Prvić Luka, a small inlet on the southern side of Ostrvo Prvić, is entered between Rt Prvić on which stands a chapel, on the southwestern side, and a point marked by a stone cross, on the northeastern side. The village of Prvić Luka, which is built on the northern

shore of the inlet, is protected by a short breakwater marked by a light, to the northwestern side of which small craft may secure.

11A-11 Northern end of Šibenički Kanal.—The southern approach to the northern passage to Šibenički Kanal is between Ostrvi Tijat to westward and Prvić to eastward. Ostrvo Prvić is cultivated and generally lower than the adjacent islands. The bounding shores of this channel, which is about $\frac{1}{2}$ mile wide, are fronted by a narrow shoal which northwestward of Rt Kobila, at about midlength of Ostrvo Prvić, extends northwestward for 400 yards. The small boat harbor of Šepurine whose mole is marked by a light lies 700 yards northward of Rt Kobila. Large vessels anchor about 550 yards southwestward of the village in about 10 to 11 fathoms, good holding sand. Small vessels moor in the small boat harbor.

The western approach to the northern passage into Šibenički Kanal is between Rt Kružić the northern extremity of Ostrvo Tijat and the southern extremity of Ostrvo Logorun, about 400 yards northward. Although the fairway of this approach has a controlling depth of about 11 fathoms, shoals bordering the entrance points restrict the channel width to about 220 yards. This approach together with the southern leads through Vodice Road to the northern entrance of Šibenički Kanal, which lies between Rt Sveti Luce, the northern extremity of Ostrvo Prvić, and the mainland about $\frac{1}{2}$ mile northeastward.

Ostrvo Logorun, bush-covered and 161 feet high, is connected to the mainland northward by a shoal on which stands Otočić Lukovnik, 102 feet high. The village of Tribunj is built on a rocky islet connected to the mainland by a stone causeway situated in a cove close northeastward of Otočić Lukovnik. The village shoreline is partially quayed for small craft and shows a light on its western side. The village of Vodice, population about 3,000, is situated on the shore of a small cove at the northern extremity of Šibenički Kanal, nearly 1 mile north-northwestward of Rt Sveti Luce. An L-shaped quayed breakwater

forms a small craft harbor. A shoal extends about 500 yards southeastward from the breakwater head. A LIGHT marks the breakwater head and a rock with a depth of less than 4 feet on the shoal is marked by a pole BEACON. The bay between Ostrvo Logorun and the mainland eastward is known as VODICE ROAD. Vessels anchor, in 8 to 9 fathoms, about 1/2 mile south-southeastward of Vodice.

The northeastern shore of the northern part of Sibenicki Kanal from Vodice to Rt Jadrija, the northwestern entrance point of Kanal Sveti Ante, a distance of about 4 miles, is bordered by a shoal which increases in width southeastward to about 1/2 mile off Rt Jadrija. PLICINA SRIMA, at about midway of this distance, is marked on its southwestern side by a pole BEACON. On the southwestern side of this channel the shore of Ostrvo Prvic is bordered by a shoal which extends as much as 400 yards offshore.

11A-12 ANCHORAGES IN SIBENICKI KANAL.—Vessels may anchor most anywhere in the middle of the approaches to Sibenik in convenient depths and good holding ground.

Vessels can anchor, in 8 to 16 fathoms good holding, northward of Otocic Lupac.

In the southeastern part of Sibenicki Kanal, anchorage, in 12 fathoms, may be taken northeastward of Otocic Drvenik.

PROHIBITED ANCHORAGE.—A submarine cable crosses from the northern end of Ostrvo Prvic. The shore ends of this cable are each marked by a BEACON. Anchorage in the cable area is prohibited.

Two SUBMARINE CABLES cross Sibenicki Kanal about 1 3/4 and 2 1/4 miles southward of the entrance of Kanal Sveti Ante.

Anchorage is prohibited within an area having its northeastern corner at Sveti Nikola Light and extending southward about 6/10 mile and westward about 1 7/10 miles. In order not to obscure Rt Jadrija Light (sec. 11A-20), vessels must not anchor in the sector between the bearings 214° and 270° on the light and bounded on the west by the meridian of Plicina Rozenik.

11A-13 DIRECTIONS FOR ENTERING—SOUTHERN PASSAGE.—This passage, which is the recommended one, should be negotiated midway between the peninsula terminating in Rt Rat at the southern end of Ostrvo Zlarin to westward and Otocic Dvaninka and Drvenik to eastward, whence the eastern shore of Ostrvo Zlarin should be favored for the deepest water.

MIDDLE PASSAGE.—A vessel using the middle passage should steer midway between Otocic Lupac and Plicina Rozenik, passing northward of the latter not closer than 250 yards. A bearing of 191° tangent to Rt Marin leads safely westward of Plicina Rozenik.

NORTHERN PASSAGE.—A vessel entering this passage from westward should steer midway between Rt Kruzic, the northern extremity of Ostrvo Tijat, and the southern extremity of ostrvo Logorun on a course of about 090°, whence after passing through Vodice Road steer a midchannel course between Ostrvo Prvic and the mainland. Deep draft vessels rounding Rt Sveti Luce in Vodice Road wishing to avoid the shoal with a depth of less than 5 fathoms that extends about 700 yards southward from the point of land directly southwestward of the village of Vodice should keep the head of the breakwater at the latter village bearing not greater than 014°.

lies between Ostrvo Zlarin and the mainland, southeastward, is the best and the most used. The middle passage lies between Ostrvo Zlarin and Ostrvo Prvić, about $1\frac{1}{2}$ miles northwestward. The northern passage lies between Ostrvo Prvić and the mainland northwestward.

Southern part of Šibenički Kanal.—The best passage to the southern part of Šibenički Kanal is the narrow deep one, about 600 yards wide, between Ostrvo Zlarin, on its western side, and Otočić Dvainka ($43^{\circ}39' N.$, $15^{\circ}53' E.$) (sec. 11A-9) and Drvenik, on its eastern side. Otočić Drvenik is marked by a light. The northeastern side of Ostrvo Zlarin is steep-to and that side of the channel should be favored for the deepest water. Otočić Krapanj, a cultivated islet 23 feet high, situated at the southeastern end of the channel, has a bordering shoal which extends nearly 1 mile northwestward and is marked at its extremity by two stone pyramidal beacons. The small craft harbor of the village of Krapanj is located on the southeastern side of Otočić Krapanj; the head of the mole is marked by a light. Fronting Rt Grmine, $\frac{3}{4}$ mile northwestward of the beacons, are several shoals with less than 6 feet of water.

Middle passage into Šibenički Kanal.—This passage is entered between Pličina Roženik (sec. 11A-9), $\frac{3}{4}$ mile north-northeastward of Rt Marin, on its southern side, and Otočić Lupac, on its northern side. A light is shown on the southeastern extremity of Otočić Lupac. Pličina Roženik, which dries, is marked on its northern side by a black conical buoy. Between this rock and the northern point of Ostrvo Zlarin is a rocky patch with a depth of 11 feet and which is marked on its eastern side by a red conical buoy. Hrid Galijola, about 6 feet high, lies on the northern side of the passage close westward of Otočić Lupac.

Prvić Luka, a small inlet on the southern side of Ostrvo Prvić, is entered between Rt Prvić on which stands a chapel, on the southwestern side, and a point marked by a stone cross, on the northeastern side. The village of Prvić Luka, which is built on the northern

shore of the inlet, is protected by a short breakwater marked by a light, to the northwestern side of which small craft may secure.

11A-11 Northern end of Šibenički Kanal.—The southern approach to the northern passage to Šibenički Kanal is between Ostrvi Tijat to westward and Prvić to eastward. Ostrvo Prvić is cultivated and generally lower than the adjacent islands. The bounding shores of this channel, which is about $\frac{1}{2}$ mile wide, are fronted by a narrow shoal which northwestward of Rt Kobila, at about midlength of Ostrvo Prvić, extends northwestward for 400 yards. The small boat harbor of Šepurine whose mole is marked by a light lies 700 yards northward of Rt Kobila. Large vessels anchor about 550 yards southwestward of the village in about 10 to 11 fathoms, good holding sand. Small vessels moor in the small boat harbor.

The western approach to the northern passage into Šibenički Kanal is between Rt Kružić the northern extremity of Ostrvo Tijat and the southern extremity of Ostrvo Logorun, about 400 yards northward. Although the fairway of this approach has a controlling depth of about 11 fathoms, shoals bordering the entrance points restrict the channel width to about 220 yards. This approach together with the southern leads through Vodice Road to the northern entrance of Šibenički Kanal, which lies between Rt Sveti Luce, the northern extremity of Ostrvo Prvić, and the mainland about $\frac{1}{2}$ mile northeastward.

Ostrvo Logorun, bush-covered and 161 feet high, is connected to the mainland northward by a shoal on which stands Otočić Lukovnik, 102 feet high. The village of Tribunj is built on a rocky islet connected to the mainland by a stone causeway situated in a cove close northeastward of Otočić Lukovnik. The village shoreline is partially quayed for small craft and shows a light on its western side. The village of Vodice, population about 3,000, is situated on the shore of a small cove at the northern extremity of Šibenički Kanal, nearly 1 mile north-northwestward of Rt Sveti Luce. An L-shaped quayed breakwater

forms a small craft harbor. A shoal extends about 500 yards southeastward from the breakwater head. A LIGHT marks the breakwater head and a rock with a depth of less than 4 feet on the shoal is marked by a pole BEACON. The bay between Ostrvo Logorun and the mainland eastward is known as VODICE ROAD. Vessels anchor, in 8 to 9 fathoms, about 1/2 mile south-southeastward of Vodice.

The northeastern shore of the northern part of Sibenicki Kanal from Vodice to Rt. Jadrija, the northwestern entrance point of Kanal Sveti Ante, a distance of about 4 miles, is bordered by a shoal which increases in width southeastward to about 1/2 mile off Rt. Jadrija. PLICINA SRIMA, at about midway of this distance, is marked on its southwestern side by a pole BEACON. On the southwestern side of this channel the shore of Ostrvo Prvic is bordered by a shoal which extends as much as 400 yards offshore.

11A-12 ANCHORAGES IN SIBENICKI KANAL.—Vessels may anchor most anywhere in the middle of the approaches to Sibenik in convenient depths and good holding ground.

Vessels can anchor, in 8 to 16 fathoms good holding, northward of Otocic Lupac.

In the southeastern part of Sibenicki Kanal, anchorage, in 12 fathoms, may be taken northeastward of Otocic Drvenik.

PROHIBITED ANCHORAGE.—A submarine cable crosses from the northern end of Ostrvo Prvic. The shore ends of this cable are each marked by a BEACON. Anchorage in the cable area is prohibited.

Two SUBMARINE CABLES cross Sibenicki Kanal about 1 3/4 and 2 1/4 miles southward of the entrance of Kanal Sveti Ante.

Anchorage is prohibited within an area having its northeastern corner at Sveti Nikola Light and extending southward about 6/10 mile and westward about 1 7/10 miles. In order not to obscure Rt. Jadrija Light (sec. 11A-20), vessels must not anchor in the sector between the bearings 214° and 270° on the light and bounded on the west by the meridian of Plicina Rozenik.

11A-13 DIRECTIONS FOR ENTERING—SOUTHERN PASSAGE.—This passage, which is the recommended one, should be negotiated midway between the peninsula terminating in Rt. Bat at the southern end of Ostrvo Zlarin to westward and Otocic Dvaninka and Drvenik to eastward, whence the eastern shore of Ostrvo Zlarin should be favored for the deepest water.

MIDDLE PASSAGE.—A vessel using the middle passage should steer midway between Otocic Lupac and Plicina Rozenik, passing northward of the latter not closer than 250 yards. A bearing of 191° tangent to Rt. Marin leads safely westward of Plicina Rozenik.

NORTHERN PASSAGE.—A vessel entering this passage from westward should steer midway between Rt. Kruzic, the northern extremity of Ostrvo Tijat, and the southern extremity of Ostrvo Logorun on a course of about 090°, whence after passing through Vodice Road steer a midchannel course between Ostrvo Prvic and the mainland. Deep draft vessels rounding Rt. Sveti Luce in Vodice Road wishing to avoid the shoal with a depth of less than 5 fathoms that extends about 700 yards southward from the point of land directly southwestward of the village of Vodice should keep the head of the breakwater at the latter village bearing not greater than 014°.

LUKA SIBENIK

Position: 43°44'N., 15°53'E.

Depths: Entrance channel, 12 fathoms.

Harbor, 15 to 20 fathoms.

Anchorage, 8 to 20 fathoms.

Quays, 6 to 33 feet.

Tide: Mean range, 0.5 foot.

Port plan: Section 11A-25.

11A-14 **LUKA SIBENIK** consists of a basin surrounded by high land sloping to a rocky shore and is entered from Sibenicki Kanal through Kanal Sveti Ante, a narrow deep water channel about 1 1/2 miles long. Three coves having some berthing facilities form the southeastern extremity of the basin. The town of Sibenik, which is built on the northeastern shore of the basin opposite the eastern entrance of Kanal Sveti Ante, is fronted by quays and a mole. A long narrow inlet, known as Krka, opens northwestward from the basin.

NAVIGATION

11A-15 For **NORTHBOUND** vessels from a position on the coastal track with Hrid Mulo Lighthouse (sec. 11A-4) bearing 039°, distant 17.4 miles, a course of 022° for 23 miles will lead clear of all dangers to Otocic Dvainka Lighthouse (sec. 11A-9), thence, from a position about 1 mile therefrom, the directions for Zlarinski Kanal (sec. 11A-9) or for the southern entrance to Sibenicki Kanal (sec. 11A-13) should be followed.

For **SOUTHBOUND** vessels from a position on the coastal track with Otocic Blitvenica Lighthouse (sec. 11A-6) bearing 052°, distant 10 miles, a course of 072° for 21 miles will lead clear of all dangers to a position with Otocic Komorica Lighthouse (sec. 11A-9) abeam bearing 342°, distant 1.2 miles, thence the directions for Zlarinski Kanal or for the southern entrance to Sibenicki Kanal should be followed. Otocic Mazirina, off the southeastern extremity of Ostrvo Zirje, will

be passed at a distance of 1.2 miles on the approach course.

CURRENT AND WIND

11A-16 **CURRENT.**—The waters entering the northeastern part of the inlet from Rijeka Krka produce a constant current toward Kanal Sveti Ante, normally in the order of 0.5 to 1.5 knots. In Kanal Sveti Ante, the current always sets outward, being stronger on the northern side. In summer, the velocity reaches 0.5 knots and in winter, after heavy rains, up to 3 knots.

WIND.—during winter the prevailing wind is from the southward. As the wind is blowing against the current, high, short waves are often formed in the port. Southwesterly and westerly winds seldom occur.

DEPTHS

11A-17 The controlling depth in the southern approach to Kanal Sveti Ante from Sibenicki Kanal is about 12 fathoms, and about 6 fathoms if the normal approach from the middle passage into Sibenicki Kanal is used.

The controlling depth in Kanal Sveti Ante is 12 fathoms with depths as great as 24 fathoms. Because of the channel's narrowness and irregularity, its navigation by vessels exceeding 650 feet in length is considered dangerous, unless tugs are used.

The harbor basin has depths of from 15 to 20 fathoms between the entrances to the southern coves and a position about 4 miles northwestward where Rijeka Krka discharges.

Depths alongside the quays and moles range from 6 to 33 feet.

LANDMARKS

11A-18 Fortress Sveti Nikola, which has a row of embrasures near the water's edge, stands on the northern edge of an islet situated on the southern side of the channel en-

trance and is most conspicuous. Also prominent from closer inshore are the lighthouses on Rt Jadrija, the northern entrance point, and on Hrid Ročni, the northernmost of a group of above-water rocks forming the southern entrance point about 300 yards southwestward of the fortress. With the fortress bearing about 049° the houses of Šibenik can be seen between the rocky cliffs of the channel. Gvozdenovac, 728 feet high and situated about 1¼ miles northward of the town, is the center one of three prominent hills, the southern one having a ruined tower on its summit. Conspicuous in the town are the fortress Sveta Ana in the northern part, and on the heights overlooking the town the old fortress Šubićevac, now used as a school.

ANCHORAGE

11A-19 Anchorage may be taken as convenient off the town between lines drawn northwestward and southwestward from the head of Gat Krka. Recommended berths exist in about 37m (20 fm) over mud in the middle of the port with the head of Gat Krka bearing between 130° and 090°. A good anchorage is in 14.6m (8 fm) to 29m (16 fm) in Uvala Sveti Petar, a prohibited area at the southwestern side of the port normally reserved for naval vessels. In Uvala Vurnaza, a cove eastward of Uvala Sveti Petar, anchorage is prohibited on a line joining positions marked by upturned anchors; and in the northwestern part of the harbor northwestward of a line drawn 060°-240° about 1 1/4 miles northwestward of Gat Krka. Several mooring buoys are in Uvala Vurnaza. Other mooring buoys are in Uvala Sveti Petar and in the harbor of Šibenik.

Vessels should avoid anchoring over a rocky patch with about 16.5m (9 fm) of water lying about 200 yards southwestward of the head of the new mole, and in the vicinity of a submarine cable crossing the harbor about 1 1/4 miles northwestward of Gat Krka. The cable landings are marked by beacons.

KANAL SVETI ANTE

11A-20 Kanal Sveti Ante, the entrance channel to Luka Šibenik from Šibenički

Kanal, is 1.4 miles long and has a minimum width of 460 feet. The controlling depth is 21.9m (12 fm). Navigation by vessels exceeding 650 feet in length is considered dangerous.

The shores of the channel slope gently at the western end, with occasional groves of trees, becoming steeper and entirely forested to eastward. A maximum elevation of 213 feet exists nears Sveti Ante Chapel, which is cut into the rock on the southern shore.

Hrid Ročni, the southwestern entrance point of the channel, is marked by a light.

A light is shown from Fortress Sveti Nikola, about 300 yards northeastward of Hrid Ročni.

Rt Jadrija, the northwestern entrance point of Kanal Sveti Ante and which is relatively low, is marked by a light; a fog signal is sounded and traffic control signals are displayed at the lighthouse. A shoal with depths of less than 9.1m (5 fm) extends about 1/2 mile south-southwestward and 2/3 mile westward from Rt Jadrija. Between the eastern edge of this shoal and the mainland on the southern side of the entrance to Kanal Sveti Ante, there is a natural channel between 400 and 500 yards wide with depths from 12m (6 1/2 fm) to 44m (24 fm).

Rt Cipac (Rat) and Debela (Debeli) Rt, about 400 and 600 yards, respectively, northeastward of Rt Jadrija, project southward on the northern side of the channel forming a cove to westward and one to eastward.

The northern shore of the channel extends eastward from Debela Rt for about 2/3 mile to Rt Baba, thence eastward about 1/3 mile to Rt Križ. Rt Burnji Turan, about 200 yards east-northeastward of the latter, forms the northeastern entrance point of the channel. Debela Rt, Rt Baba, and Rt Križ are each marked by a light.

On the southern side of the channel a cove is formed between the islet on which stands Fortress Sveti Nikola and Rt Senišna, 500 yards northeastward. Rt Senišna is marked by a light.

Rt Lašunić lies on the southern side of the channel a little more than $\frac{1}{2}$ mile north-northeastward of Rt Senišna and is marked by a light.

Rt Južni Turan (Paklena), nearly $\frac{1}{2}$ mile eastward of Rt Senišna; forms the southeastern entrance point of the channel. A submarine cable marked by opposing beacons crosses the channel between Rt Južni Turan and Rt Burnji Turan. A light is shown on Rt Južni Turan.

Pličina Paklena extends about 250 yards offshore from a position about 300 yards eastward of Rt Južni Turan and is marked at its extremity by a light.

HARBOR

11A-21 The basin which forms Luka Šibenik has a mean width of about $\frac{1}{2}$ mile and is about 2 miles long from the head of Uvala Sveti Petar to Uvala Stanuća (Stomuća). The peninsula of Mandalina which terminates at Rt Kulina at the southeastern extremity of the harbor forms two coves, Uvala Sveti Petar to southwestward and Uvala Vurnaža to northeastward. The peninsula of Mandalina contains naval facilities and a naval ship repair yard. Navigation is prohibited in Uvala Sveti Petar southward of a line joining Rt Kulina and Rt Ravna, about $\frac{1}{5}$ mile northwestward. A radio station and mast at the head of Uvala Vurnaža are conspicuous. Uvala Klobučac is a smaller cove entered northward of Uvala Vurnaža and contains several lumber loading berths for small vessels.

The town of Šibenik, situated on the northeastern side of the harbor, is fronted by quays and two moles. A light is shown from both outer extremities of Gat Vrulje and from the head of Gat Krka. Conspicuous in the town is the Fortress of Sveta Ana which stands at an elevation of 266 feet close northeastward of the principal church. There is a traffic control signal station at the fortress for vessels westbound through Kanal Sveti Ante. Overlooking the town northward at a height of 423 feet is the Fortress

of Sveti Ivan and close southeastward at Šubićevac, 324 feet high, is a prominent school building.

Uvala Stanuća opens about $\frac{3}{4}$ mile northwestward of the northern mole. There is a wharf on its eastern side adjacent to a carbide and cyanimide factory.

The depths in the harbor range from 28m (15fm) to 37m (20 fm) except in the southern coves, a narrow shoal bordering the western side of the town, and a 6.5m (3 $\frac{1}{2}$ fm) patch midway between Rt Kulina and the root of the southern mole and is marked by a buoy moored close northwestward.

Krka Inlet, an arm of Luka Šibenik, extends about 3 miles northwestward of the harbor to Rt Triska, the eastern entrance point of Rijeka Krka. It is spanned by a bridge, with a clearance of 101 feet (30.8m), about 2 $\frac{1}{2}$ miles north-northwestward of Gat Krka light. Beyond the mouth of Rijeka Krka, the extremity of the inlet is called Uvala Zaton, a small bay about 1 mile long. Zaton, a small village, is at the head of the bay.

Lights are shown on the southeastern corner of the quay at Zaton, on Rt Triska, and on Rt Velika Kapela in a position about $\frac{1}{4}$ mile southeastward of Rt Triska.

PILOTAGE

11A-22 Pilotage is compulsory. Pilots board vessels, night and day, 3 miles west-southwestward of Rt Jadrija, or in Šibenicki Kanal if the vessel is anchored there. By special arrangement pilots can board off Otocić Dvanka (sec. 11A-9).

NAVIGATION REGULATIONS FOR KANAL SVETI ANTE

11A-23 Inbound traffic is regulated by signals shown from Fortress Sveti Nikola and outbound traffic by those shown from Fortress Sveta Ana in Šibenik. Speed through the channel must not exceed 6 knots.

Two red balls disposed vertically or two green lights similarly arranged indicate the channel is clear.

A red cone, apex upwards, or two red lights disposed vertically indicate the channel is not clear.

Vessels of 50 gross tons and greater must indicate by signals their desire to transit the channel, ingoing vessels 10 minutes before arriving at the entrance, and outgoing vessels 10 minutes before getting under way. This signal is flag Z of the International Code of Signals, or two lights disposed vertically, the upper white and the lower red.

If the signal station indicates the channel is not clear, or if no signal is made, vessels must wait until the clear signal is displayed.

DIRECTIONS FOR ENTERING

11A-24 Vessels requiring a depth of 6 fathoms bound from northwestward, after clearing Placina Rozenik and the rocky patch east-southeastward of it, should close the northeastern point of Ostrvo Zlarin by about 400 yards, thence steer on the range astern of the tangent to the two northern points of Ostrvo Zlarin, about 058°, until the entrance to Kanal Sveti Ante bears 011°, thence the approach should be made on that bearing as a course. The light structures on Hrid Rocni and Debela Rt in range 027°, lead clear southeastward of the shoal extending south-southwestward from Rt Jadrija.

Vessels bound from the southern part of Sibenicki Kanal should bring Rt Jadrija Lighthouse ahead bearing 004° and when Fortress Sveti Nikola opens northward of Hrid Rocni Lighthouse steer through the center of the entrance.

Vessels proceeding through the channel should keep in midchannel avoiding the shoals extending about 100 yards from Rt Cipac and Rt Senisna and at the eastern end of the channel favor Rt Kriz and Rt Burnji Turan rather than the southern side.

FACILITIES

11A-25 Sibenik with a population of about 50,000 (1964), is built in the form of an amphitheater close to the shore at the foot of a barren mountain range whose summit at Orlovaca rises to 1,627 feet, about 3 1/2 miles eastward of the town. Sibenik ranks fourth among the ports of Yugoslavia, the principal exports being lumber, bauxite, lignite, carbide, cyanamide, and cellulose.

BERTHS.—Northwest Wharf, used for gen-

eral cargo and ore, has a berthing length of 500 feet, with an alongside depth of 23 feet.

Dolac Quay, used for general cargo and bauxite, has a berthing length of 1,450 feet, with alongside depths of 9 to 11 feet.

Gat Vrulje (3 November Quay) has a berthing length of 1,120 feet, with alongside depths of 9 to 29 feet.

Dobrika Quay, used for general cargo, has a berthing length of 750 feet, with alongside depths of 9 to 29 feet.

Rogac Pier, a coal pier, has a berthing length of 2,200 feet with alongside depths of 29 to 33 feet.

Sipad Wharf, used for lumber, has a berthing length of 1,400 feet, with alongside depths of 18 to 29 feet.

SUPPLIES.—Provisions are limited. Water is available from hydrants on quays. Fuel oil is not available.

REPAIRS.—Minor repairs can be made. A floating drydock and two marine railways are available.

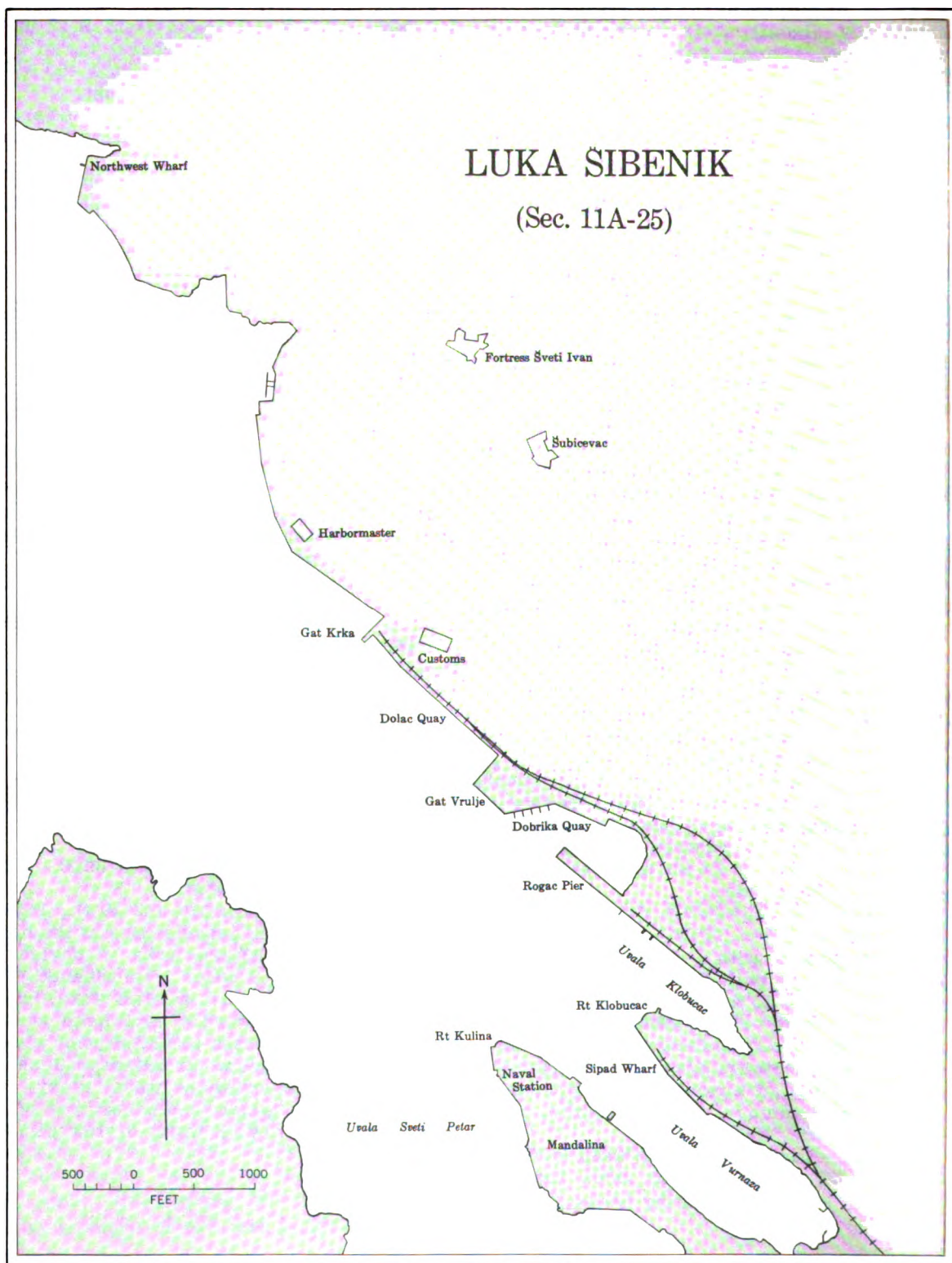
COMMUNICATIONS.—There is regular coastwise steamer service and non-scheduled foreign service. Sibenik is the terminus of a single track railway from Split, where connection is made to Zagreb and Susak. A coastal highway from Susak to the southern frontier passes through sibenik. There is telegraph and radio service for public correspondence and telephone connection with all the larger towns.

HOSPITAL.—There is a hospital that accepts seamen.

DERATTING.—Deratting can be carried out and Deratting Certificates and Deratting Exemption Certificates issued.

RIJEKA KRKA AND PROKLJANSKO JEZERO TO LUKA SKRADIN

11A-26 LUKA SKRADIN (43°49'N., 15°55'E.), used by small vessels, lies at the head of navigation of Rijeka Krka, a navigable distance of about 8 miles from Sibenik. The river enters Krka Inlet at Rt Triska, about 3 miles northwestward of Gat Krka at Sibenik. From Rt Triska to Rt Vulinac, where the river flows from Prokljansko Jezero, the banks are everywhere steep, rocky, and fronted by deep water. A difficult turn of about 110° in a river width of 153 yards



exists at Rt Sveti Josip. For assisting larger vessels in negotiating this turn there is a chain equipped with a hand winch installed on a rock close off Rt Sveti Josip.

Prokljansko Jezero, across which Rijeka Krka flows, is a brackish lake about 1 by $3\frac{1}{4}$ miles in extent. The shores of the lake are low and sandy with some rocks. The northern part of the lake is shallow and dangerous for navigation. A least depth of 47 feet can be carried over the normal route from Šibenik to Rt Oštrica, the southern entrance point of the upper part of Rijeka Krka. There is good anchorage in about 7 fathoms over good holding mud southwestward of Rt Oštrica.

Two overhead power cables cross the river close westward of Prokljansko Jezero; vessels with heights up to 88 feet may pass under them.

Dragacin Rock lies about $\frac{3}{4}$ mile west-southwestward of Rt Oštrica. It is marked by a concrete block with a topmark of two red cones, base to base.

Luka Skradin is approached from Prokljansko Jezero at Rt Oštrica through the upper part of Rijeka Krka, a distance of $1\frac{3}{4}$ miles. The river to Luka Skradin has depths of 19 to 23 feet. The port has a small quay with $7\frac{1}{2}$ feet alongside.

Navigational aids.—Rijeka Krka between Krka Inlet and Skradin is marked by lights shown on the following points: Rt Triska, Rt Samac, Rt Veliki Tradan, Rt Sv. Josip, Margaretusa W. (Vukinac) Rt, Rt Oštrica, Rt Bila Stina, Rt Lukovo, and Rt Dut.

A light is shown on the southeastern corner of the quay at Skradin, and on the head of the mole at Rasline, a small village about $\frac{1}{4}$ miles westward of Rt Oštrica. Several mooring buoys are located off the quay.

COASTAL FEATURES, OFF-LYING ISLANDS, AND CHANNELS, TRIBUNJ TO RT OŠTARIJE

11A-27 Between Tribunj (sec. 11A-11) and Rt Oštarije, the southeastern entrance point of Pašmanski Kanal, 15 miles north-

westward, the mainland coast which is generally steep and high is extremely irregular and fronted by many islands, islets and rocks.

Ostrvo Murter, the largest of the off-lying islands, is 6 miles long in a northwest-southeast direction and rises to its summit of 410 feet at Raduč toward the northern end of the island. Rt Rat, its southern extremity, is situated nearly $\frac{3}{4}$ miles westward of Tribunj. Uvala Sveti Nikola is a small bay situated about $\frac{1}{4}$ miles northwestward of Rt Rat and affords the only shelter for small vessels on the southwestern side of the island. Sveti Nikola chapel is conspicuous at the head of the cove of the same name. A light is shown on the head of a mole in Uvala Sveti Nikola.

A light is shown on Rt Murteric about 2 miles west-northwestward of Rt Rat.

Islets southwestward of Ostrvo Murter.—Hrid Kukuljar, 13 feet high, is the easternmost of several islets and rocks lying about $\frac{2}{3}$ mile off Ostrvo Murter westward of Rt Rat and is marked by a light. Hrid Mišine, 6 feet high, situated about $1\frac{1}{4}$ miles southward of the northern extremity of Ostrvo Murter, is marked by a light. Otočić Prišnjak, 69 feet high, located about 1 mile northward of the latter, is marked on its western side by a light; a fog signal is sounded at the lighthouse.

11A-28 Murterski Kanal is entered from southward between Rt Rat, the southern extremity of Ostrvo Murter, and Rt Obinuš Veli ($43^{\circ}46' N.$, $15^{\circ}42' E.$) a point, 92 feet high with a prominent chapel, on the mainland a little more than 1 mile eastward. Ostrvo Murter, forming the southwestern side of the channel, is connected to a peninsula of the mainland by a swing bridge at the village of Tijesno, about $2\frac{1}{2}$ miles northwestward of the southern entrance. Transit of the narrows at the bridge is limited to craft not exceeding $6\frac{1}{2}$ feet of draft and a breadth of 35 feet. The bridge is opened at any time of day or night upon the proper signal. Currents

in the canal are variable and attain a rate of 4 knots.

Several islets and dangers lie at the southern entrance to Murterski Kanal. Greben Bačvica, an islet marked by a light beacon, lies on the eastern side of the approach about 1 mile south-southeastward of Rt Obinus Veli. Otocic Drazemac Veli, the larger and southern of two islets, lie on the western side of the approach about $\frac{3}{4}$ mile southeastward of Rt Rat. Plicina Mijoka with 17 $\frac{1}{2}$ feet of water lies about $\frac{1}{2}$ mile westward of the larger of the two islets, mentioned above, and is marked on its southern side by a light buoy. Otocic Maslinjak, 121 feet high, lies midway between Rt Obinus Veli and Rt Rat, and is marked on its southwestern side by a light.

Anchorage is afforded in the southeastern part of the canal for large vessels in 11 to 14 fathoms, sand, good holding ground. The northwestern part of the canal consists of rock covered with a fine layer of sand; it is not a recommended anchorage. The bora does not raise a heavy sea in the canal.

Lights are shown from the mole head and from the swing bridge at Tijesno. The light on the southern side of the bridge changes color when the draw is open. The mole-heads at two ports for small craft are marked by lights, one at Betina near the northwestern entrance point of Murterski Kanal, and at Hramina at the head of a cove on the northern part of Ostrvo Murter. A light is shown on the southeastern head of the L-shaped pier at Jezera, located about $\frac{3}{4}$ mile southward of Tijesno.

11A-29 Pirovački Zaliv and approaches.—Pirovački Zaliv, about 2 $\frac{1}{2}$ miles long, is entered between Rt Rat, the northwestern extremity of the peninsula forming the northeastern shore of Murterski Kanal, and the mainland, about 1 mile northeastward. A chain of islets extends northwestward from Ostrvo Murter, and, together with the northern end of that island, forms the southwestern side of the approach to Pirovački Zaliv. Otočić Artica Vela, the western and larger of the two outermost islets, about

2 $\frac{1}{2}$ miles northwestward of the northwestern end of Ostrvo Murter, is marked on its southwestern side by a light. Otočić Arta Vela, the largest of the chain and situated close southeastward of Otočići Artice, forms with a point on the mainland 700 yards eastward, a narrow passage in the approach to Pirovački Zaliv. Greben Kušija, with a depth of less than 6 feet, lies near the outer end of a reef which extends about 600 yards into the narrow passage, leaving a constricted channel having a depth of 23 feet in the fairway. The rock is marked by a light and its southwestern side is marked by a pole beacon with ball top mark. Rt Rat and the eastern side of Otočić Teginja, 1 $\frac{1}{4}$ miles northwestward, are each marked by a light. Pirovački Zaliv should not be entered without benefit of local knowledge. The village of Pirovac is situated on the northeastern side of the bay near its head. The quay at the village which is marked by a light will accommodate craft of shallow draft.

11A-30 Southern approach to Pašmanski Kanal.—A group of islands, islets, and rocks lies westward and southwestward of Otočić Arta Vela in the southern approach to Pašmanski Kanal (sec. 11A-31) and may be divided for purposes of navigation into two groups. Ostrvo Vrgada, the largest of the eastern group, lies with Rt Kranje, its southeastern extremity, about 1 mile west-southwestward of Otočić Arta Vela. Ostrvo Vrgada, 371 feet high, has steep forest-covered sides to southwestward, whereas the northeastern slopes are gentle and cultivated.

A cylindrical concrete beacon, situated on a rock on the northeastern side of the entrance and painted black on top and white below, marks the entrance to Uvala Sveti Andrija, a shallow bay located on the northwestern side of the island; the beacon should be passed to the southwestward when entering.

Conspicuous from northeastward are the reddish-colored slopes on the northern coast and a chapel in a village at an elevation of 157 feet on the northeastern side. Two islets are disposed northwestward and numerous

others south-southeastward of Ostrvo Vrgada. Otočić Visovac, 79 feet high, lies midway between Otočić Prišanjak (sec. 11A-27) and Otočić Murvenjak, the largest isle south-southeastward of Ostrvo Vrgada. Otočić Murvenjak is 207 feet high, partially grass-covered, and can be identified by vineyards on its southwestern side and by the light color of its southeastern point.

Several islets lie southward of Rt Borovnjak, the southeastern extremity of Ostrvo Pašman, and form the western group. These islets constitute, also, the northeastern entrance point of Srednji Kanal. Otočić Obun,

the southernmost of these islets, is 72 feet high, and lies about 2 miles southward of Rt Borovnjak. Otočić Gnalić, 36 feet high, bare, whitish, and sometimes inconspicuous, lies about $\frac{3}{4}$ mile east-southeastward of Rt Borovnjak.

Pakoštane, a village on the mainland coast nearly 2 miles southeastward of Rt Oštarije, is fronted by several islets. A light is shown from the head of a mole for small craft at the village. A shoal in the harbor entrance is marked by a masonry beacon surmounted by a metal pole. This beacon must be left to port on entering.

Directions for southern approach to Pašmanski Kanal.—Vessels approaching Pašmanski Kanal from southward may use conveniently in daylight either the passage westward of Ostrvo Murter and Otočić Arta Vela where a least depth of 12 fathoms can be carried, or the passage between the eastern and western groups of islets where a least depth of 15 fathoms can be obtained.

If the former is used, bring the lighthouse on Otočić Arta Vela ahead bearing about 342° from a position 400 yards east-northeastward of Otočić Visovac, and when Rt Kranje is abeam to southwestward steer 317° for the entrance of the channel, passing the lighthouse on Otočić Arta Vela about 0.3 mile to east-northeastward.

If the passage between the two groups of islets is used bring Otočić Gnalić ahead in range with Rt Oštarije bearing 000° , altering course on approaching Otočić Gnalić so as to pass it by at least 200 yards, whence course may be shaped for the entrance to Pašmanski Kanal.

PAŠMANSKI—ZADARSKI KANAL

11A-31 Pašmanski and Zadarski Kanal lie between the mainland, on their northeastern sides, and Ostrvi Pašman and Ugljan, on their southwestern sides. The two islands are separated by an extremely narrow strait. Though essentially one channel, that part bordered by Ostrvo Pašman is known as Pašmanski Kanal, and the part bordered by Ostrvo Ugljan, as Zadarski Kanal, section 11A-35. In this work the two channels will be handled as one. Except for the area encumbered by islets and shoals between the village of Pašman on the island of the same name and the village of Turanj on the mainland, the channel varies in width from about 1 mile at its southeastern end to about 4 miles at its northwestern end, and is about 23 miles in length. With the exception of the shoals before mentioned, the depths vary from 8 to 29 fathoms.

There are two passages in the encumbered

narrows off Pašman, an eastern and a western. The western, which is deeper but the more intricate, has a controlling depth of $25\frac{1}{2}$ feet. The eastern has a controlling depth of 20 feet and is easier to negotiate. The maximum draft for these passages is 21 feet.

The bottom consists of sand and shells almost everywhere. The water being clear, its depth appears less than it is actually.

The country on both sides of the channel is cultivated, that on the mainland being backed by a range of desolate hills. The shores of both Ostrvo Pašman and Ostrvo Ugljan slope gently to the water. The southern part of the latter is wooded.

Southern part of Pašmanski Kanal.—Pašmanski Kanal is entered from southeastward between Otočić Oštarije ($43^{\circ}55' N.$, $15^{\circ}28' E.$), close southward of the point on the mainland of the same name, and Rt Borovnjak, the southeastern extremity of Ostrvo Pašman, $1\frac{1}{2}$ miles south-southwestward. Both shores are bordered by a narrow shoal but no dangers exist at a distance beyond 500 yards offshore.

A light is shown from Otocio.

The village of Tkon lies on the shore of Ostrvo Pašman about $2\frac{1}{2}$ miles northwestward of Rt Borovnjak. There is a conspicuous chapel above the village and another one $\frac{1}{2}$ mile northwestward. A mole with two arms forms an artificial harbor for small craft. A light is shown from the molehead.

The village of Biograd, population about 1,900, stands on a small peninsula of the mainland, 2 miles northwestward of Rt Oštarije. A shallow reef, marked on its western side by a black buoy surmounted by a cone, extends about 150 yards northward from the peninsula, and a spit with depths of less than 3 fathoms extends about 400 yards farther northward. A conspicuous church rises close eastward of an artificial harbor for shallow draft vessels formed by a broad mole and an I-shaped breakwater. A light is shown from the head of the mole. The conspicuous

church and a modern hotel can be seen for the entire length of the canal.

Small vessels anchor in a bay just northward of Biograd with protection from all winds; large vessels anchor in front of the entrance of the bay. Anchorage is prohibited on a line between the conspicuous hotel and Tkon.

For the southern approach to Pašmanski Kanal, see section 11A-30.

11A-32 Narrows in Pašmanski Kanal.—Pašmanski Kanal narrows to a width of 1 mile between the villages of Pašman and Turanj and for about the same distance northwestward. The narrows are encumbered by islets and shoals between which irregular currents are experienced.

The narrows may be considered to lie between Biograd and Rt Krmčine, about 5 miles northwestward, on the mainland northeastern side, and between Tkon and Rt Nevidane, about the same distance northwestward, on the southwestern side.

From Biograd the northeastern shore, after forming a small cove northward of the village promontory, trends northwestward $1\frac{1}{2}$ miles to the village of Filip-Jakov which has a prominent church belfry. Three mole-enclosed basins front the village. The center one, which is marked by a light, will accommodate small craft; the others are for boats. Turanj lies $\frac{3}{4}$ mile northwestward, from which village a mole, 312 feet long, extends southwestward. Vessels moor to the outer end of the mole. The bottom in front of the village is rocky and unsuitable for anchorage. Conspicuous are the red belfry in the village and a beacon close offshore northwestward of the mole, and a light which is situated on the head of the L-shaped mole. Rt Krmčine lies $2\frac{3}{4}$ miles northwestward of Turanj.

The 3-fathom curve along this shore varies between 150 and 475 yards offshore. Numerous shoals of lesser depth, which will be described later, are dispersed offshore of the 3-fathom curve.

The southwestern shore from Tkon to Pašman, $2\frac{1}{2}$ miles north-northwestward,

forms a slight bight westward which contains the small boat harbors of Ugrinić and Kraj. A conspicuous monastery stands on the point at the harbor of Kraj. The village of Pašman is built on a low flat projection flanked by a cove on each side. On the southeastern shore of the northern cove is a conspicuous church with belfry. An L-shaped breakwater forms a small craft harbor at Pašman, from the head of which a light is shown. Rt Brižine, the northeastern point of a blunt projection, lies about $\frac{3}{4}$ mile northwestward of Pašman. Between a point about $\frac{1}{2}$ mile west-northwestward of Rt Brižine, and Rt Sveti Mihovila, about $\frac{1}{2}$ mile farther west-northwestward, there are two bays separated by a projection on which the village of Mrljane is situated. An L-shaped breakwater at the village forms a small craft harbor. Rt Nevidane lies about $\frac{1}{2}$ mile northwestward of Rt Sveti Mihovila. A breakwater marked by a light at Rt Nevidane encloses a small craft harbor. A dangerous wreck lies 300 yards eastward of the breakwater. The village of Nevidane, in which there is a conspicuous belfry, is situated $\frac{1}{4}$ mile southwestward of the point.

The 3-fathom curve along this shore between Tkon and Kraj varies between 125 and 450 yards offshore. Between Pašman and Rt Nevidane it lies between 100 and 430 yards offshore. The islets and shoals fronting the coast between Kraj and Pašman will be described later.

11A-33 Islets and shoals in the narrows.—Otočić Sveta Kata and Otočić Planac, 400 yards northwestward, lie almost in mid-channel between Biograd and Tkon. Both islets are bordered for a distance of about 90 yards with a shoal having depths of less than 3 fathoms. A detached rock with 12 feet of water lies 200 yards eastward of the former. Otočić Sveta Kata is 82 feet high and is covered with tall pines. A light is shown from the southwestern extremity of Otočić Sveta Kata from which position is sounded a fog signal. Otočić Planac, 56 feet high, is sparsely covered with brush. This islet is connected southwestward to Ostrvo

Pasman by a sand ridge having a depth of about 27 feet on the axis of the western passage. A light is shown from the northern point of Otočić Planac.

A chain of four islets lying on a shoal spit extends $1\frac{1}{2}$ miles southeastward from the projection on which is built the village of Pašman. These islets form the southwestern side of the western passage. The outer one, Otočić Čavata, is 39 feet high, bare and light-colored. A light is shown from a position about 45 yards northeastward of the northeastern extremity of Otočić Čavata. Northward of Otočić Čavata and in the order named are Otočić Veliki Dužac, Mali Dužac, and Muntan. Veliki Dužac is 39 feet high and cultivated for the most part. Mali Dužac is only 5 feet high and is bush-covered. Muntan is 43 feet high and similarly covered.

Otočić Babac ($43^{\circ}57' N.$, $15^{\circ}24' E.$), the largest islet in the narrows, lies with its western extremity 450 yards eastward of the breakwater at Pasman. A submarine cable extends in a west-southwesterly direction from near the western extremity of Otočić Babac to the shore of Pasman. This islet separates the two passages. Otočić Babac, 105 feet high, is partly covered with dense brush and partly cultivated, particularly the northeastern side near the village of Babac. Its western point, which is low, is marked by a light, from which position is sounded a fog signal; another light marks the eastern point. Otočić Komornik, 62 feet high and partly cultivated, lies 325 yards north-northwestward of Otočić Babac to which it is connected by a sand and rock shoal with depths less than 16 feet. A light is shown from the northeastern point on Otočić Komornik. Otočić Frmic, a small islet 30 feet high and containing the ruins of a monastery, is located 450 yards southwestward of Otočić Babac.

Four islets lie close to the northeastern shore of the narrows at a position about midway between Filip-Jakov and Rt Krmcine. Otočić Galešnjak, the largest in this group, is bush-covered and light in color. The islet has two prominent conical hills, 98 and 118 feet high, respectively. A light is shown about 100 yards southward of Otočić Galeš-

njak. Otočić Ričul, 82 feet high, round and bare, lies close southeastward. A light is shown on the southern point of Otočić Ričul. Flanking Galešnjak northwestward are two light-colored and sparsely covered islets, Otočić Bisaga Veli, 56 feet high, to northeastward, and Otočić Bisaga Mali, 36 feet high, to southwestward.

On the northwestern side of the narrows and connected to Ostrvo Pašman by a shallow shoal, about $\frac{1}{2}$ mile westward of Rt Brižine, is situated Otočić Garmenjak, 75 feet high and partly covered with bush and grass.

Hrid Školjić, 6 feet high, rises from a detached reef about 200 yards in diameter in a position 800 yards northwestward of Otočić Garmenjak.

Pličina Gorskovski, a patch with a depth of 20 feet, is situated with its center 500 yards north-northwestward of the light on Otočić Babac's western point. The western extremity of Otočić Babac in range with the eastern extremity of Otočić Čavata, bearing 143° – 323° , leads safely southwestward of Pličina Gorskovski.

A shoal with a depth of $15\frac{1}{2}$ feet lies near the middle of the western passage about 190 yards southward of the westernmost light on Otočić Babac. Another patch with a depth of 17 feet lies close south-southeastward. Otočić Ošljak, a conspicuous conical and wooded islet about 10 miles northwestward, over Rt Brižine, bearing 133° – 313° , leads clear southwestward of these patches.

Pličina Kočerka lies about 900 yards eastward of the southeastern extremity of Otočić Babac. Its center which is rocky and above water is marked by a light.

Pličina Minerva, with a depth of 14 feet, is the northern of three patches lying near the middle of the eastern passage, west-southwestward of the village of Turanj. A light is shown on Pličina Minerva. Three other patches with a depth of 16 feet lie midway between Pličina Minerva and the light on Pličina Kočerka. The eastern extremity of Otočić Komornik in range with the western extremity of Otočić Galešnjak, bearing 132° – 312° , leads clear southwestward of Pličina Kočerka. Pličina Minerva, and the intervening patches.

11A-34 Directions for western passage.

—A vessel approaching the narrows from southeastward should steer to pass Otočić Sveta Kata Lighthouse about 300 yards to southwestward and about the same distance northeastward of the light structure off Otočić Čavata. From the latter position the vessel should steer for the summit of Kapelica, a hill 256 feet high situated about 1 mile northwestward of Pašman, bearing about 307°. In clear weather, Otočić Ošljak, about 10 miles northwestward, may be sighted and brought to bear 318° over Rt Brižine, which is low. The shallowest part of the western passage lies northward of Otočić Čavata where a least depth of 25½ feet will be found. When the southern end of Otočić Muntan is abeam to southwestward, the head of the breakwater at Pašman should be brought dead ahead bearing 316°. As soon as the southeastern end of Otočić Komornik opens northwestward of Otočić Babac, bearing about 021°, the shoal patches southward of the lighthouse have been cleared. A course midway between Pličina Gorskovski and the breakwater at Pašman leads northwestward clear of all dangers. See section 11A-33 for danger bearing of Pličina Gorskovski.

Vessels must not exceed 10 knots between Otočić Komornik and Biograd.

Directions for eastern passage.—A vessel approaching the narrows from southeastward may pass between Otočić Sveta Kata and the mainland or between Otočić Planac and Otočić Čavata. If the former is used a vessel, from a position about 1 mile southeastward of Otočić Sveta Kata, should steer with the light on Pličina Kočerka and the church at Turanj in range 328°. If the latter passage is desired a vessel should steer to pass Otočić Sveta Kata Lighthouse about 300 yards to southwestward and about the same distance northeastward of the light structure off Otočić Čavata. When about midway between these two islets the vessel should steer with the light on Pličina Kočerka and the church at Filip-Jakov in range 008°.

The courses specified for either of the two approaches should be maintained until the eastern side of Otočić Komornik comes in range with the western side of Otočić Galešnjak, bearing 312°, whence that range should be steered towards Otočić Komornik. This course clears Pličina Minerva and the patches southeastward therefrom. The church in Turanj in range with the southern side of Otočić Komornik, bearing 074°-254°, indicates the northern limit of Pličina Minerva. Otočić Komornik should be passed eastward and northeastward at a distance of 250 yards, whence a course midway between that islet and Otočić Galešnjak will lead clear to northwestward. The shallowest part of this route through the eastern passage lies between Otočić Komornik and the mainland where a least depth of 20 feet will be found.

11A-35 Northern part of Pašmanski-Zadarski Kanal.—The northeastern shore of the channel between Rt Krmčine (44°00' N., 15°22' E.) and Rt Skala, 15 miles northwestward, is backed by low hills and cultivated ground.

This shore is free of off-lying dangers and may be approached anywhere to ½ mile in 6 fathoms of water.

Rt Podvara, 4 miles northwestward of Rt Krmčine, forms the southern entrance point, and Rt Sveti Ivan, ½ mile farther northwestward, forms the northern entrance point of Luka Sukošan, a bay about ½ mile in diameter. The village of Sukošan lies on the southeastern shore of the bay from which extends a breakwater with a quayed l-shaped head suitable for berthing small craft. The head of the breakwater is marked by a light. A light is shown from a position 150 yards westward of Rt Podvara.

The line joining Rt Podvara and Rt Artina, the northeastern extremity of Ostrvo Pašman, 2 miles southwestward, is considered the division between Pašmanski Kanal to southeastward and Zadarski Kanal to northwestward.

The village of Bibinje is built on a short peninsula about 1 mile northwestward of Rt Sveti Ivan. There is a breakwater at the village with a quayed outer end available for small craft. From Bibinje to Rt Kolovarc (Punta di Collovare), 2 miles northwestward, the coast forms a bight to northeastward which is indented by several shallow coves. Luka Gazenica ($44^{\circ}05'N.$, $15^{\circ}17'E.$) is located northward of Uvala Sveta Jelena, the middle cove of the bight. The port consists of two parallel moles, about 165 yards apart, extending in a west-southwesterly direction from the shore. Pier space is on the north side of each mole with the narrower western extensions serving as breakwaters. The north mole is about 465 yards long. The southern mole is about 380 yards long, and is also used for offloading petroleum products. The northern pier was reported to have 26 to 39 feet alongside.

A conspicuous belfry shows from the town of Borgo Erizzo, situated about $\frac{1}{2}$ mile northwestward of Rt Kolovarc.

Luka Zadar, described in section 11A-39, is entered between the northern extremity of the peninsula on which stands the town of Zadar, 2 miles northwestward of Rt Kolovarc, and Oštri Rat (Rt Amika), 1 mile farther northwestward.

Between Oštri Rat and Rt Radman, $3\frac{3}{4}$ miles northwestward, the coast forms a bight, the shores of which contain several prominent chapels. There is a small mole for boats at the village of Diklo, about $1\frac{1}{2}$ miles northward of Oštri Rat.

Rt Radman is tree-covered and conspicuous. The point is marked by a light. A ruined breakwater, at the village of Petrcane Donje, is in a cove eastward of Rt Radman. Rt Skala, the northeastern entrance point of Zadarski Kanal, lies 1 mile northwestward of Rt Radman.

11A-36 The southwestern shore of the channel from Rt Nevidane to Otočić Jidula

($44^{\circ}10'N.$, $15^{\circ}04'E.$), about 17 miles northwestward, with the exception of a few islets which are relatively steep-to, is free of off-lying dangers. The 6-fathom curve lies 800 yards off Rt Nevidane, whence it closes the coast northwestward to a distance not greater than 200 yards off Ostrvo Ugljan. A 26-foot patch lies about $\frac{3}{4}$ mile northward of the conspicuous church at Dobropoljana, which is situated $1\frac{1}{4}$ miles northwestward of Rt Nevidane.

At Dobropoljana there is a small breakwater-enclosed harbor for small craft. The small boat harbor of Banj lies at the head of Uvala Sveta Kuzma, $1\frac{1}{4}$ miles west-northwestward of Dobropoljana. The village of Ždrelac is situated at the head of Uvala Sveti Luka, 1 mile northwestward of Banj. A breakwater with a quayed L-shaped head forms a small craft harbor. A light is shown from the head of the breakwater.

Prolaz Ždrelac ($44^{\circ}01'N.$, $15^{\circ}16'E.$), the passage between Ostrvi Pašman and Ugljan, is entered between Rt Artina, the northeastern point of the former, and Rt Zaglav, the southeastern point of the latter. The passage, which has a controlling depth of 10 feet, consists of a central bay about 600 yards in diameter entered from northeastward through a narrows, 525 feet wide, and thence southwestward through a channel 26 feet wide. A submarine cable crosses the narrowest part of Prolaz Ždrelac. Three beacons in range 018° – 198° lead through the southwestern channel, the latter being about 200 yards long and marked by two pairs of pole beacons. A conspicuous chapel stands on Rt Zaglav. The light on Otočić Karantunic (sec. 11A-48) which lies close off the southwestern extremity of Ostrvo Ugljan can be seen from both sides of the passage, as can that at Kukljica, about 1 mile northward.

11A-37 The southwestern shore of ZadarSKI Kanal trends 1 mile northwestward from Rt Zaglav to Uvala Kukljica, at the head of which is situated the village of the same name. A quay and numerous jetties protected by a breakwater form a harbor for small craft. On the northern entrance point, a small peninsula 164 feet high, there is a large conspicuous stone cross, and at its extremity a light is shown.

Otočić Mišnjak, 39 feet high and nearly bare, lies about 600 yards offshore between Rt Artina and Kukljica. The islet is inconspicuous against land background.

Rt Rahovača, about $2\frac{1}{4}$ miles northwestward of Kukljica, is the eastern entrance point of Luka Kali, where, at the head of the cove at the village of the same name, there is a boat harbor formed by two quayed breakwaters and a jetty. A light is shown from the head of the eastern breakwater.

Otočić Ošljak, a steep-to, conspicuous, conical, wooded islet, 295 feet high, lies $\frac{1}{2}$ mile northward of Rt Rahovača and about the same distance offshore. There is a small boat harbor protected by a quayed breakwater at the village on the northwestern side of the islet. A light is shown from the northeastern side of the islet.

Luka Preko, located $1\frac{1}{2}$ miles northwestward of Rt Rahovača, consists of two coves each containing a small harbor, separated by a point which is connected by a shallow bar to a close off-lying islet, Otočić Galevac. The islet is 43 feet high and wooded. The town of Preko, about 2,200 population, consists of houses sprawled along the slopes of the bay. A monastery and a water tank are conspicuous in the town. The southern harbor consists of a breakwater, quayed on one side for berthing vessels up to 10 feet draft. A boat harbor formed by two moles in dis-

repair lies close southwestward of the breakwater. A light is shown from the head of the breakwater. The northern harbor has a quayed breakwater which will accommodate vessels up to 10 feet draft on its outer southwestern end. There are several jetties for boats on Otočić Galevac and westward of the breakwater.

Šćah Vrh, the summit of Ostrvo Ugljan, rises to 945 feet about 2 miles westward of Preko.

Rt Sveti Petar, on which there is a conspicuous chapel, lies 800 yards northward of Otočić Galevac. Pličina Poljana, with depths of less than 4 fathoms, extends 300 yards southeastward from Rt Sveti Petar and is marked on its southeastern extremity by light.

Uvala Sutomišćica is entered 1 mile northwestward of Rt Sveti Petar. There is a mole for berthing small craft off the village of Sutomišćica at the southeastern part of the bay. Rt Sveti Grgur, the eastern entrance point of the bay is marked by a light.

Uvala Lukoran Veli, entered westward of Rt Marović, about $\frac{3}{4}$ mile northwestward of Rt Sveti Grgur, has a quay for vessels of $10\frac{1}{2}$ feet draft and a mole for securing boats on the eastern side of the cove near the village of Lukoran. A light is shown from the northern edge of the quay.

Between Rt Marović and Luka Ugljan, $2\frac{1}{2}$ miles northwestward, there are several points of land and small coves. A small craft harbor at the head of the cove near the village of Ugljan is formed by a breakwater having two knuckles with the western side of the outer two sections quayed. A light is shown from the head of the breakwater. On the western side of the cove there is a

conspicuous monastery with a stone cross above.

Rt Sveti Petar, the northwestern extremity of Ostrvo Ugijan, is situated 2 1/2 miles northwestward of Luka Ugijan. Otocio Jidula, the northwestern entrance point of Zadarski Kanal, is a conical islet 92 feet high, connected to Rt Sveti Petar, 500 yards south-eastward, by a shoal having a depth of less than 4 fathoms.

11A-38 ANCHORAGES IN PASMANSKI-ZADARSKI KANAL.—Depths and bottom in this channel permit moderate-to large-sized vessels to anchor most anywhere. Similarly, small vessels in necessity will find an anchorage in suitable depth under a weather shore most anywhere. Recommended anchorage berths for large vessels follow:

Numerous berths of 600 yards or more in diameter off Rt Krmcine in 33 to 49 feet of water with the eastern summit of Otocio Galesnjak bearing 130°, distant 1.2 miles and greater. Similar berths can be found also between Rt Krmcine and Rt Plitkaca, 3 1/2 miles northwestward, somewhat northeastward of the bearing previously given.

Several berths of 600 yards in diameter and greater 600 yards or more westward of the town of Zadar in 8 to 22 fathoms.

Unlimited number of berths between Ostri Rt and Rt Radman at 800 yards or greater offshore in 15 to 20 fathoms over mud or sand.

PROHIBITED ANCHORAGE.—Anchoring is prohibited in the vicinity of a submarine cable which crosses Pasmanski Kanal from a position close southeastward of Biograd to a position close southeastward of Tkon. The crossing is marked on each side by a BEACON.

Vessels are prohibited from stopping between a line extending southwestward across

Zadarski Kanal from Ostri Rt and a line extending southwestward from a position about 1 1/4 miles southeastward of Ostri Rt.

LUKA ZADAR

Position: 44°07'N., 15°13'E.
 Depths: Entrance, 20 to 50 feet.
 Harbor, 14 to 54 feet.
 Quays, shallow to 32 feet.
 Port plan: Section 11A-47.

11A-39 LUKA ZADAR is an artificially improved natural inlet formed between the mainland coast and a small peninsula extending 3/4 mile northwestward and parallel to the coast from a position a little more than 1 mile northwestward of Rt Kolovaro (sec. 11A-35). The town of Zadar occupies the peninsula. Suburbs spread southeastward and have developed on the northeastern shore of the harbor.

CURRENT AND WIND

11A-40 CURRENT.—The current in the harbor is negligible. That in Zadarski Kanal off Zadar becomes variable under the influence of wind and weather, with a maximum of 2 knots in a northwest direction.

WIND.—Winds are often strong from the south, but do not cause high waves. The northeasterly wind rarely blows in the port, and are never strong. During the summer brief but violent north-northwesterly squalls producing rough seas are sometimes experienced, and are preceded always by a rise in humidity and a fall of barometric pressure.

Outside the port winds from the northwestward and southeastward cause high waves.

DEPTHS

11A-41 The depths in the approach to Luka Zadar are over 10 fathoms. A depth of 20 to 50 feet can be carried through the narrow entrance between the head of the breakwater and Radnicka Obala, the northeastern quay of Zadar peninsula. Depths in the harbor, clear of the bordering shoals, range from 14 to 54 feet. The alongside depths at the quays range from shallow depths to 32 feet. There is no anchorage available in the port for medium to large vessels. There are two anchorage berths, 120 yards in diameter, in about 4 fathoms of water.

LANDMARKS

11A-42 Conspicuous from afar are Bokanjac, a vegetation-covered hill, 344 feet high, situated 1 1/2 miles northeastward of the town; the belfry of the cathedral located near the center of town and which is visible 8 miles in clear weather; the yellow cupola on the college buildings on the southwestern shore of the town, which, from southeastward, is visible 5 miles; and the row of tall buildings facing seaward from Obala Marsala Tita. From closer inshore the following are prominent: the signal station on Ostri Rat; a white bathing house at the head of a cove, 1/2 mile east-southeastward; a whitish four-story building about 1/2 mile southeastward of the bathing house; and a chimney, 98 feet high, near the root of the breakwater.

ANCHORAGE

11A-43 For anchorage offshore of Zadar, see section 11A-38.

Vessels anchor, in 17 to 21 fathoms, about 500 to 650 yards off the southwestern side of the peninsula, with the belfry of the cathedral bearing between 230° and 270°.

Anchorage is prohibited within 500 feet northwestward of the pontoon bridge.

HARBOR

11A-44 The harbor is entered between Ostri Rat and the peninsula on which stands the town of Zadar. A LIGHT is shown from a position alongside a SIGNAL STATION situated on the southwestern extremity of Ostri Rat. The signal station operates during daylight only and is connected to the telegraph system. A FOG SIGNAL is sounded at this station.

Between Ostri Rat and Rt Vitrnjak, 800 yards east-southeastward, is a shallow cove containing several piers for boats. The shore between Rt Vitrnjak and the root of the breakwater, 3/4 mile southeastward, is indented by three shallow coves having piers for boats. A spit with depths of less than 18 feet extends off each of the points forming the coves, that off Rt Vitrnjak extending about 450 yards southward, and is marked near its extremity by a red conical BUOY.

The inner harbor is protected by a breakwater, Lukobrana Porporela, which extends 175 yards south-southwestward from the mainland toward the peninsula, providing an entrance about 75 yards wide. The inner harbor is 1,340 yards long and varies between 100 and 200 yards wide. Its shores are almost completely quayed. Uvala Boska, a shallow inlet, extends about 180 yards northeastward from the northeastern part of the harbor. Uvala Gizi, a shallow bay, lies in the southernmost part of the harbor.

The southwestern side of the peninsula is similarly quayed, terminating at its southern extremity, eastward of the college buildings, in a boat basin. A damage mole extends about 240 feet southwestward from the southern quay.

A LIGHT is shown from the northern corner of the peninsula. The head of Lukobrana Porporela is marked by a LIGHT.

A pontoon bridge crosses the inner harbor about 600 yards from the entrance. Anchoring is prohibited within 164 yards of the bridge, and vessels are not to approach closer than 50 feet.

PILOTAGE

11A-45 Pilotage is compulsory. Pilots board near the entrance and are available day and night.

DIRECTIONS FOR ENTERING

11A-46 Vessels approaching from north-westward should make for Oštri Rat, and, from a position about 220 yards southwestward of the light structure on the point, steer for the southwestern side of the peninsula, course about 132°. When the dolphin with mooring bollard, 340 yards northwestward of the prominent chimney near the root of the breakwater, bears 090°, the vessel should be headed for the head of the breakwater, course about 111°, thence course may be shaped for the entrance, passing the head of the breakwater not closer than 30 yards. Vessels approaching from southwestward should round the head of the peninsula not closer to westward and northwestward than 230 yards, thence from a position with the head of the breakwater bearing about 111°, the foregoing directions may be followed.

Signals.—When entering, vessels are to give one long blast on the whistle, about 220 yards northwestward of Radnička Obala, then stop, and wait for docking orders.

When departing, and all lines are clear of the quay, 3 long blasts should be given on the ship's whistle.

Note.—No other signals are to be given except in an emergency, and then only those which are prescribed by the International Rules of the Road.

Regulations.—When two vessels arrive simultaneously at the entrance of the harbor the vessel to starboard has the right of way.

Vessels passing each other at the entrance of the harbor must give the right of way to vessels leaving the harbor until the

leaving vessel is clear of the entrance.

FACILITIES

11A-47 Zadar, originally known as Zara, together with a small surrounding area, was ceded to Italy by Austria in 1919, and in 1947 was ceded to Yugoslavia. It is a town of antiquity with narrow crowded streets except for the large imposing buildings on Obala Maršala Tita facing the sea. It contains several noteworthy churches including a cathedral. The population of about 20,000, 1961, is engaged in the production of liquors, olive oil, wine, and tobacco.

Berths.—The particulars of the berths, which are numbered for reference to the port plan only, are as follows:

Berth	Length (feet)	Depth (feet)
1	390	16½
2	830	16½
3	675	12
4	460	6-10
5	385	8-12
6	160	8-13
7	475	3½-7
8	635	6½-10
9	570	3-10

All other quays, including Obala Maršala Tita, have shallow depths alongside and are used by small craft.

Supplies.—Provision needs can be met. Small quantities of coal, fuel oil, and lubricating oil can be procured. Water is available from hydrants on Radnička Obala and Lukobrana Porporela.

Repairs.—There is a small shipyard engaged in the construction of fishing craft and where small castings can be made.

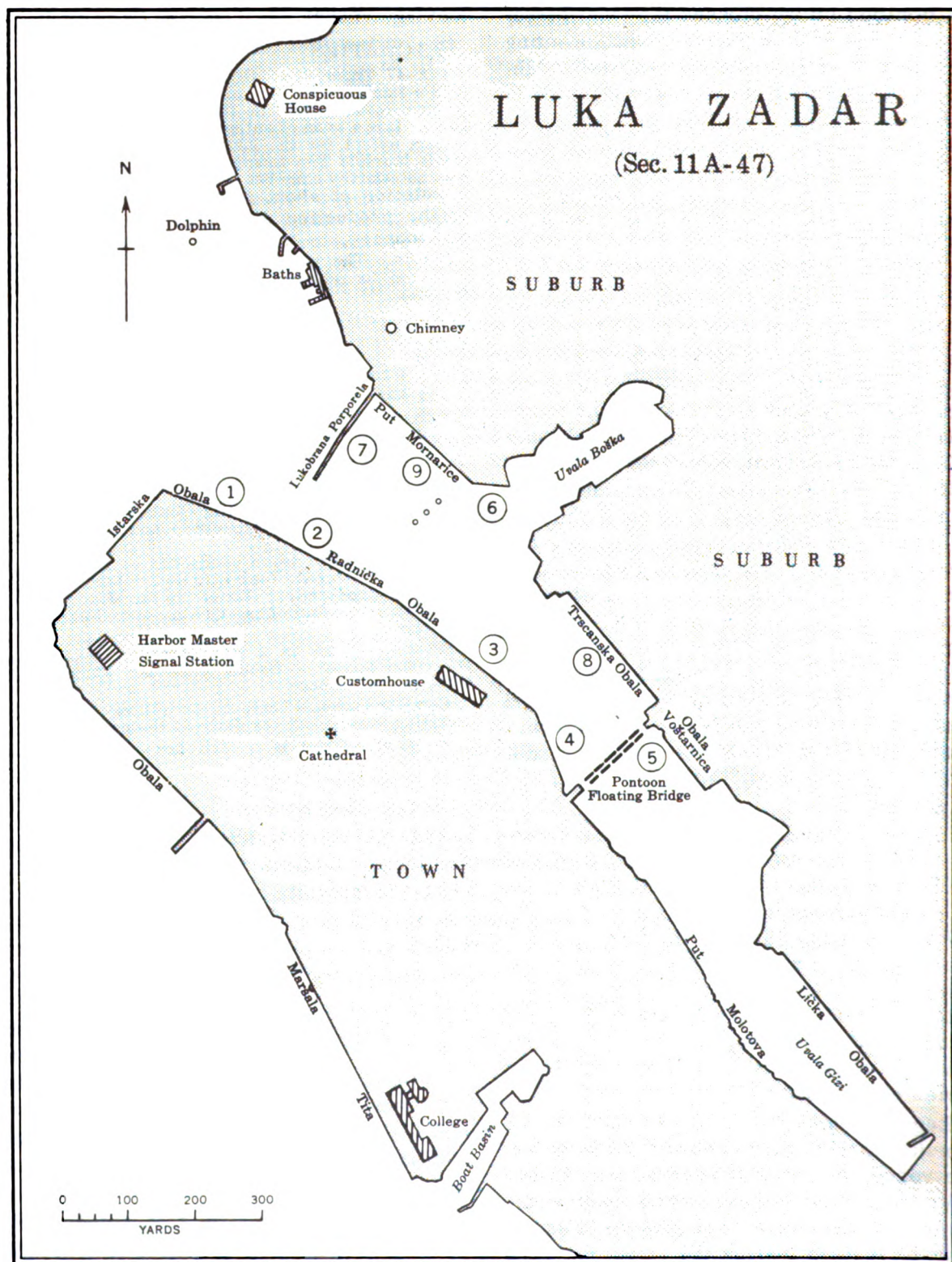
Communication.—There is no railway at Zadar. Coasting vessels call regularly at the port.

Hospital.—There is a civil hospital of 200-bed capacity.

SREDNJI KANAL

11A-48 Srednji Kanal, meaning Middle Channel, in common with Pašmanski-Zadarski Kanal provides a protected channel from the vicinity of Luka Šibenik and Rt Ploča, and, through a number of other channels at its northwestern end, to Luka Zadar and Mali Kvarner. This channel, about 25 miles long in a northwest-southeast direction with a minimum width of about 1 mile, has a controlling depth of 15 fathoms. It lies directly southwestward of Ostrvi Pašman and Ugljan, and is separated from Dugi Otok and Ostrvo Kornat, to southwestward, by a number of islands, islets, and lesser channels.

Srednji Kanal is little frequented, preference being given in good weather to the



coastal track seaward of all the off-lying islands, and, under other circumstances, to Pašmanski-Zadarski Kanal. Vessels requiring the superior depth provided in Srednji Kanal will encounter no serious difficulty in navigation during daylight.

The channel is entered from southeastward between Otočić Obun ($43^{\circ}51' N.$, $15^{\circ}28' E.$) (section 11A-30), on its northeastern side, and the southeastern extremity of Ostrvo Žut, $4\frac{1}{4}$ miles west-southwestward. Several islets lie northwestward of Otočić Obun and between it and the southwestern shore of Ostrvo Pašman. Otočić Košara, 279 feet high, the northwesternmost islet of the group, is conical, steep-to, and of yellowish color. Its southwestern side is marked by a light.

Ostrvo Žut lies on the southwestern side of Srednji Kanal about 1 mile northeastward of Ostrvo Kornat. It is fronted on all sides except its southwestern by islets and dangerous rocks for a distance of from 1 to 2 miles, and should not be approached within that distance. See section 11A-5. Hrid Galijolica, 3 feet above water, lies closest to the fairway of the channel in a position about $1\frac{1}{2}$ miles west-southwestward of Otočić Kosara. A light is shown from Hrid Galijolica.

Ostrvo Sit, with two islets close southeastward and two close northwestward, narrows Srednji Kanal to its minimum width of 1 mile, whence northwestward the channel broadens considerably. A light is shown from Otočić Balabra Mala, an islet about $\frac{1}{2}$ mile north-northwestward of Ostrvo Sit. Ostrvo Sit, 276 feet high at its southern end which is situated $3\frac{3}{4}$ miles northwestward of Otočić Kosara, is 2 miles long and is cultivated on its southwestern side. Most of the islets adjacent to Ostrvo Sit and between it and Ostrvo Žut are bare, deserted, light yellow in color, and without landmarks.

The southwestern side of Ostrvo Pašman is, for the most part steep-to, uninhabited, and covered with brushwood.

Otočić Karantunić, 59 feet high, which lies close off the southwestern extremity of Ostrvo Ugljan at the entrance to Prolaz Ždrelec (sec. 11A-36) is marked by a light. The

western side of Ostrvo Ugljan is wooded and sparsely inhabited. It is steep-to and devoid of off-shore dangers. The castle of Sveti Mihovil, which is conspicuous, stands on a hill, 869 feet high, 1 mile southeastward of Šćah Vrh, the summit of Ostrvo Ugljan (sec. 11A-37). A signal station is located on Sveti Mihovil Castle. Between Otočić Karantunic and Rt Japlenicka, $2\frac{1}{4}$ miles northwestward, the shore of Ostrvo Ugljan is indented by several coves with off-lying islets.

The southwestern shore of the northern part of Srednji Kanal is formed by Ostrvo Iž an island about $6\frac{3}{4}$ miles long, whose northeastern shore is cultivated with olive groves and vineyards. Several islets flank the island. Otočić Mrtovnjak, an islet 72 feet high, and marked by a light, lies about $\frac{3}{4}$ mile north-northeastward of Rt Parda, the southeastern extremity of Ostrvo Iz. Two dangerous rocks with less than 6 feet of water lie about $\frac{3}{4}$ and $1\frac{1}{4}$ miles respectively, west-northwestward of Rt Osiljinac, the northern extremity of Ostrvo Iz. Anchorage is prohibited, because of a submarine cable, between a point about 2 miles northwestward of Rt Parda and Rt Gubac (sec. 11A-55). Rt Arta is about $1\frac{1}{2}$ miles northward of Rt Parda. A light is shown from the head of the breakwater at the small craft harbor of Komasevo, $\frac{3}{4}$ mile northwestward of Rt Arta. The village of Iz Veli, population 2,000, is situated at the head of a cove, about $2\frac{1}{2}$ miles northwestward of Rt Arta. Several quays for small craft and two basins for fishing boats front the village. A light is shown from the southern entrance point of the cove. A submarine cable crosses Srednji Kanal northeastward of Iz Veli. Another submarine cable crosses Srednji Kanal northeastward of a point about 1 mile north-northwestward of Iz Veli. Anchorage is prohibited in the vicinity of the cables.

11A-49 Directions.—A vessel proceeding northwestward through Srednji Kanal should pass Otočić Košara and the islets lying southeastward of it at a distance of about $\frac{1}{2}$ mile to southwestward, and from a position between Otočić Košara and Hrid

Galijolica, head for midchannel between Ostrvo Pašman and Otočić Gangarol, the second islet southeastward of Ostrvo Sit, whence, a course of 315° leads clear of dangers to the northern part of the channel. In all cases the shores of Ostrvi Pašman and Ugljan should be favored rather than the islands and islets southwestward.

For a description of the channels communicating with the northern part of Srednji Kanal see section 11A-60.

CHANNELS LYING SOUTHWESTWARD OF SREDNJI KANAL

11A-50 Several lesser channels lie southwestward of Srednji Kanal between Ostrvo Sit and Iž (sec. 11A-48), on their northeastern side, and Ostrvo Kornat and Dugi Otok, on their southwestern side. Kornatski Kanal lies southwestward of Ostrvo Kornat between it and a chain of numerous off-lying islets.

Ostrvo Kornat, the southern of the two larger islands, is $13\frac{1}{2}$ miles long and has a maximum width of about $1\frac{1}{2}$ miles. From a distance it appears as a range of whitish conical hills rising to its summit at Veli Vrh, 771 feet high, about 4 miles from its northern end.

Dugi Otok lies about 11 miles offshore of the mainland and is separated from Ostrvo Kornat, to southeastward, by Prolaz Proversa. This island is 24 miles long and has a maximum width of about $2\frac{1}{2}$ miles. The northwestern end of Dugi Otok has low rocky land of whitish appearance, whence its height increases southeastward in a range of ash-colored hills partly wooded and partly covered with bush. Vela Straža, the 1,109-foot summit, stands close southward of the middle of the island. Dugi Otok is separated from Ostrvo Molat, to northwestward by Prolaz Maknare (sec. 11A-58).

ZUTSKI KANAL

11A-51 Žutski Kanal lies between Ostrvo Žut, on its northeastern side, and Ostrvo

Kornat, on its southwestern side. The channel is about 8 miles long and varies between 700 yards and $1\frac{1}{4}$ miles wide. A depth of 14 fathoms can be carried throughout its length. A number of islets and rocks lie at its southeastern entrance. The islets at the northwestern entrance are relatively steep-to and there are no hidden dangers in mid-channel.

A light is shown from the northern part of Smokvica Islet, located close southeastward of Ostrvo Kornat.

Ostrvo Žut, $6\frac{1}{2}$ miles long, widens from its slender southeastern end to a maximum width of about $1\frac{1}{2}$ miles. The island is hilly and stony and covered with bushes, grass, and scanty cultivation; its summit, 577 feet high, lies near the southwestern side at about its mid-length. The southwestern side of Ostrvo Žut in Žutski Kanal is relatively straight and steep-to, whereas its northeastern side in Sitski Kanal is profusely indented and fronted by many dangers.

Directions for Žutski Kanal.—A vessel proceeding through Žutski Kanal from southeastward from Žirjevski Kanal or from Otočić Blitvenica should follow the directions given in section 11A-6. After passing Plićak Čavlin (sec. 11A-6) and the dangers lying about 2 miles southeastward and eastward of Rt Opat ($43^\circ 44' N.$, $15^\circ 28' E.$), the southeastern extremity of Ostrvo Kornat, a vessel should close the northeastern shore of that island until past the group of islets in the entrance of Žutski Kanal. A $6\frac{1}{2}$ -fathom patch lies $\frac{1}{2}$ mile off Ostrvo Kornat near the islets in the entrance; vessels wishing to avoid this patch should close Ostrvo Kornat to $\frac{1}{4}$ mile before arriving 1 mile southeastward of the mentioned islets. After passing the islets a vessel should proceed in mid-channel between Ostrvo Žut and the islets off-lying Ostrvo Kornat to a position about 600 yards southwestward of the western extremity of Ostrvo Žut, thence pass between Otočić Gornja Aba, 246 feet high, having an above-water rock off-lying southeastward, on

the western side, and Otočić Breskvenjak, 112 feet high, on the eastern side. From the latter position, a course of 325° leads into water clear of dangers.

SITSKI KANAL

11A-52 Sitski Kanal separates Ostrvo Žut and Ostrvo Sit and the two islets lying southeastward of it. This channel is so encumbered with islets, rocks, and dangers that it is unsuitable for navigation without local knowledge.

LAVDARSKI KANAL

11A-53 Lavdarski Kanal lies between the southeastern part of Dugi Otok and Ostrvo Lavdara with two islets northwestward and one southeastward. The channel has a minimum width of about ½ mile and a least depth in the fairway of about 36 fathoms. Between Rt Čuška (43°54' N., 15°14' E.), the southeastern extremity of Dugi Otok, and Rt Bluda, 3½ miles northwestward, the shore of Dugi Otok is indented by several coves. Rt Bluda is the northern entrance point of a cove, at the head of which are two small craft basins protected by a breakwater marked by a light at the village of Sali. Uvala Triluke, 1¼ miles northwestward of Rt Bluda, consists of three coves. The northern cove, before the village of Zaglav, contains two boat basins. The northern entrance point of the cove is marked by a light. Hrid Pohlib, 13 feet high, lies near the end of a shoal extending from the southern entrance point of the cove. A light is shown on Hrid Pohlib. Uvala Zamscica is formed close southwestward of Rt Zman, 3 1/4 miles northwestward of Rt Bluda. A quayed breakwater forms a small craft harbor in the cove near the village of Zman. A light is shown from the northern side of the cove.

Off-lying the bight formed between Uvala Triluke and Rt Žman are two islets. Otočić Krknata, 59 feet high and covered with olive groves and vineyards, is the larger. Otočić Krava, close southeastward, is 79 feet high

and being bleak and of light color, stands out prominently. There is an anchorage berth, 600 yards in diameter, in about 10 fathoms over good holding sand, between Otočić Krknata and Dugi Otok.

Ostrvo Lavdara, on the northeastern side of the channel, is 2 miles long, 285 feet high, steep-to, and for the most part bare but has an olive grove on the southwestern side. A light is shown from the northern point of the island. Two islets lie nearly 1 mile and 1¼ miles, respectively, northwestward of the northern point of Ostrvo Lavdara. Foul ground lies between the two islets. A rock covered with 6 feet of water lies midway and slightly southwestward between Ostrvo Lavdara and the next islet northwestward. Another rock with 22 feet of water lies ¾ mile east-northeastward of Otočić Krknata. Otočić Lavdara Mala, 92 feet high, lies close southeastward of the southern extremity of the larger island.

Directions for Lavdarski Kanal.—Lavdarski Kanal is entered from Žutski Kanal, southeastward, between Rt Čuška and Otočić Lavdara Mala. From a position on the departure course of 325° from Žutski Kanal with Rt Čuška abeam, a vessel should enter the channel between Otočić Lavdara Mala and the shore of Dugi Otok, thence close eastward of Rt Bluda and Otočić Krknata; the southwestern side of the fairway should be favored to avoid by a safe distance the two rocks previously mentioned.

IŠKI-RAVSKI KANAL

11A-54 There are two channels between Ostrvo Iž and Dugi Otok, which are in common entered from southeastward between Rt Parda (44°00' N., 15°10' E.), the southern extremity of Ostrvo Iž, and Rt Žman, and from northwestward between Rt Osiljinac, the northern extremity of Ostrvo Iž, and Rt Kamičina (44°05' N., 15°01' E.), a point on Dugi Otok about midway between Rt Čuška and Rt Borji, the northeastern extremity of

Dugi Otok (sec. 11A-58). **Ostrvo Rava**, 2½ miles long and partly covered with vineyards and olive groves, lies slightly southwestward of midway between **Ostrvo Iž** and **Dugi Otok** and divides the passage into **Iški Kanal**, on its northeastern side, and **Ravski Kanal**, on its southwestern side.

Submarine cables are laid from the central eastern coast of **Dugi Otok** to a position near the western extremity of **Ostrvo Rava**; from near the northern extremity of **Ostrvo Rava** to the northwestern part of **Ostrvo Iž**; and from the northeastern part of **Ostrvo Iž** to the central western coast of **Ostrvo Ugljan** (sec. 11A-31).

Iški Kanal is about 8 miles long and has a minimum width of nearly 1 mile. A minimum depth of about 25 fathoms can be carried through this channel.

Two islets and several detached submerged rocks lie off the southwestern shore of **Ostrvo Iž** for a distance of ¾ mile. Four islets lie westward and southwestward of **Rt Osiljinac**. Several detached shoals with depths as little as 5 feet extend 1½ miles west-northwestward from **Rt Osiljinac**. Deep water prevails off the northeastern shore of **Ostrvo Rava** except for a detached patch of 6½ fathoms lying in the entrance of a bight southward of **Rt Obrajac**, the northeastern point of **Ostrvo Rava**.

Uvala Brbinj is entered southward of **Rt Koromašnjak** on **Dugi Otok**, about ½ mile southward of **Rt Kamičina**. The village of **Brbinj** lies on the northwestern shore of the cove and is fronted by a quay, 137 feet long, with an alongside depth of 10 feet. A light is shown on **Rt Koromašnjak**.

Directions for Iški Kanal.—A vessel approaching from southeastward between **Rt Žman** and **Rt Parda** should lay a course of 322° so as to pass **Rt Obrajac**, the northeastern extremity of **Ostrvo Rava**, at a distance of 500 yards.

11A-55 Ravski Kanal lies between **Ostrvo Rava** and **Dugi Otok**. It is about 4 miles long with a minimum width of about 500 yards, reduced to a fairway width of about

400 yards, in which there is a depth of 16 fathoms, between two opposing reefs with 32 and 28 feet of water, respectively. A minimum depth of 16 fathoms can be carried through the channel providing the narrow fairway before mentioned is negotiated safely. Vessels drawing more than 25 feet are advised against using this channel.

Ravski Kanal is entered from southeastward between **Rt Komorina** (44°00' N., 15°05' E.), the southern extremity of **Ostrvo Rava**, and **Otočić Luški**, a long islet lying close northwestward of **Rt Gubac**, 1¼ miles northwestward of **Rt Žman**. A rock, 16 feet high, lies close off **Rt Komorina**. **Otočić Maslinovac**, 79 feet high, lies in mid-entrance and is marked by a light. **Uvala Luka** lies between **Rt Gubac** and **Otočić Luški** on its northeastern side and **Dugi Otok** on its southwestern. A mole forms a small craft harbor before the village of **Luka** at the head of the cove. There are three anchorage berths of 600 yards diameter each in from 9 to 16 fathoms of water in **Uvala Luka**. The berth near the head of the cove has sand bottom with holding quality superior to the others. Anchorage is prohibited on a line between **Rt Gubac** and a point northeastward on **Ostrvo Ist** (sec. 11A-48).

The southwestern shore of **Ostrvo Rava**, between **Rt Komorina** and **Rt Garmina**, 1½ miles northwestward, has a fringing shoal extending about 300 yards offshore. **Uvala Marinica**, containing a small craft harbor, lies close southeastward of **Rt Garmina** which is marked by a light. A reef with a depth of 32 feet extends about 300 yards southwestward from **Rt Garmina**, and a shoal with a depth of 28 feet extends about 200 yards northeastward from a point on the coast of **Dugi Otok**, southwestward of **Rt Garmina**. The before mentioned narrows lie between these two shoals.

Otocic Mrtovnjak, 151 feet high, lies in the middle of the northern entrance to **Ravski Kanal**. A 3-foot rock lies close southward. A detached 26-foot patch lies 500 yards north-northwestward of **Otocic Mrtovnjak**. A 23-foot rock lies ½ mile farther north-north-

westward. Another detached 26-foot patch lies 1/2 mile northward of Rt Zaglavac, the northern extremity of Ostrvo Rava. A detached 26-foot rocky patch lies about 1/2 mile southeastward of Otočić Mrtovnjak.

Directions for Ravski Kanal.—A vessel bound through Ravski Kanal from south-eastward should head for Otočić Maslinovac, passing midway between that islet and Otočić Luški, and then close the shore of Dugi Otok, keeping at least 300 yards offshore of the southwestern shore of Ostrvo Rava. The western side of Otočić Mrtovnjak in range with the eastern side of Rt Pelegrin, an islet with a chapel close off a point, 1 3/4 miles north-northwestward, bearing 157°–337°, leads through the fairway between the shoals off Rt Garmina. When clear of these shoals with Rt Garmina bearing 090° or more, head for midchannel between Otočić Mrtovnjak and Rt Zaglavac, from which position a course of 341° leads clear of dangers in the northern approach to Ravski Kanal and Iški Kanal.

KORNATSKI KANAL

11A-56 Kornatski Kanal lies between Ostrvo Kornat, on its northeastern side, and a chain of islets and rocks, usually with deep water between, on its southwestern side. It is about 13 miles long from Rt Opat, the southern extremity of Ostrvo Kornat, to Otočići Sestrice (43°51' N., 15°13' E.) at its northwestern entrance. It is entered from southeastward between Rt Opat and Otočić Škulj, an islet, 476 feet high, and the highest of the off-lying chain, about 1/2 mile south-southeastward.

Navigation of Kornatski Kanal is difficult and the tidal currents set strongly through the narrow passages. It should not be used without local knowledge.

Otočići Sestrice are two islets, Sestrica Velika, the larger and 184 feet high, and Sestrica Mala, 98 feet high, situated at the northwestern entrance to Kornatski Kanal about 1 mile south-southeastward of Rt Vidilica, the southwestern extremity of Dugi

Otok. A light marks the northwestern point of Otočić Sestrica Velika, the western islet.

SOUTHERN END OF DUGI OTOK

11A-57 Luka Telašćica is formed between the two southern extremities of Dugi Otok and consists of several natural basins, the whole about 4 miles long with a greatest width of about 1 mile. The bay is surrounded by barren hills and is one of the best harbors, though without facilities, in this part of the Adriatic. The depths, clear of dangers, vary from 7 1/2 to 35 fathoms. It is entered between the Otočići Sestrica Velika, Aba Mala, Aba Velika, and Katina, on the eastern side, and Rt Vidilica (43°52' N., 15°12' E.), the southwestern extremity of Dugi Otok, and Rt Turčina, a point 1/2 mile northward, on the western side.

The obscured dangers in the entrance and in the three southernmost basins are as follows: a shoal with depths of less than 10 feet extends about 175 yards southeastward from Rt Vidilica; a detached 5 1/2-fathom patch on the eastern side of the entrance, about 800 yards southeastward of Rt Vidilica; a rocky foul area in the easternmost cove of the first basin; a detached 17-foot patch lying 300 yards southeastward of an above-water rock located close off the northern entrance point of the second basin; a 22-foot patch about 250 yards farther southeastward; a reef extending about 175 yards northwestward from Hrid Galijola, a rock, 13 feet high, situated in the northwestern part of the first basin; and a detached 12-foot patch 400 yards off the northwestern shore of the second basin. With the exception of the heads of the several contained coves, the shores of the three southernmost basins may be approached safely to a distance of 150 yards.

Two passages, Prolaz Proversa Mala between Otočić Katina and Dugi Otok to northward, and Prolaz Proversa Velika between the same islet and Ostrvo Kornat to southward, connects Luka Telašćica to the northwestern approach to žutski Kanal. The

former is very narrow and is suitable for boats only. The southern and larger passage has a depth of 7 feet in the fairway which is marked by stone pyramids, painted in black and white bands. The shallow area of the channel is marked by signs on Otocic Katina.

There is good anchorage in Uvala Cušćica, a small bay entered between Rt Cuska and the northeastern entrance point of Prolaz Proversa Mala, about $\frac{1}{2}$ mile southwestward. The depths are about 15 fathoms over sand and shells, good holding ground.

A bank with depths of less than 4 fathoms extends about 300 yards southeastward from Rt Cuska.

Anchorage in Luka Telašćica.—There are numerous anchorage berths of 600 yards diameter in from 9 to 35 fathoms clear of the dangers in the first basin, and at least one each in the second basin and in Uvala Katina, a bay immediately southward of Otočić Katina. There is almost unlimited anchorage space for small vessels.

Directions for entering Luka Telašćica.—Vessels should pass eastward of the southwestern extremity of Dugi Otok and westward of the islets at the entrance. When the harbor opens, the eye is the best guide, being mindful of the dangers previously described.

PROLAZ MAKNARE

11A-58 Prolaz Maknare is the western part of a passage between Ostrvo Molat, on its northern side, and Dugi Otok and other islands, on its southern side. Prolaz Velo Žaplo is the name given to the narrows, but generally the former name applies to the passage in its entirety. Prolaz Maknare is generally taken by vessels eastbound for Zadar and leads to the southern end of Mali Kvarner, the northern end of Zadarski Kanal, and through other channels to the northern end of Srednji Kanal. The controlling depth in the passage by the usual route is about 32 feet. By avoiding certain patches, described later, and by passing between Otočić Vrtlac and Rt Križ, a depth of about 49 feet can be obtained.

Northern side.—Rt Bonaster ($44^{\circ}12' N.$, $14^{\circ}51' E.$), the extremity of a narrow peninsula having six hillocks extending south-southeastward from the western side of Ostrvo Molat, lies about 3 miles north-northeastward of Veli Rat, the northwestern extremity of Dugi Otok (sec. 11A-3). Rt Bonaster has a distinctive blackish appearance and is marked by a light. Ostrvo Molat, about $5\frac{1}{2}$ miles long, is irregular in outline and consists of wooded hills of which the highest is conical and 495 feet high, situated near the middle of the island. The southeastern part of Ostrvo Molat has an irregular shore, Stopanji Rt forming the eastern point, and Rt Žaplo, the southern. Otočić Tun Mali lies close off Rt Žaplo and forms with Ostrvo Tun Veli, 400 yards southeastward, the narrows of the passage. A light is shown from the eastern side of Uvala Lučina, about $1\frac{1}{4}$ miles northwestward of Rt Žaplo, and another light is shown on the southern end of Otočić Tun Mali.

Submarine cables are laid between the central eastern coast of Ostrvo Žverinac and the southwestern coast of Ostrvo Tun Veli, and from the southeastern coast of Ostrvo Tun Veli to the northwestern coast of Ostrvo Sestrunj. A submarine cable crosses Prolaz Maknare between the southwestern end of Ostrvo Molat and the northwestern end of Dugi Otok. A submarine cable extends in a general west-northwesterly direction from the northern end of Ostrvo Sestrunj to the southeastern shore of Ostrvo Molat.

Southern side.—On the southwestern side of Prolaz Maknare, the northern extremity of Dugi Otok forks into two points, that to westward curving in the form of a hook. Veli Rat ($44^{\circ}09' N.$, $14^{\circ}49' E.$) is the southern of the two westernmost points on the hook and is marked by a light. Otočić Brščak, 141 feet high, lies close off Rt Borji, the northeastern extremity of Dugi Otok, to which it is connected by a reef. Otočić Golac, 118 feet high marked by a light, lies 500 yards northwestward of Otocic Brscak. Otocici Lagnici are two low, flat, whitish rocks situated 1 mile northwestward of Veli Rat Lighthouse. They lie on a shoal about 1,200 yards in diameter.

On the southern side of Prolaz Maknare, northeastward of and paralleling Dugi Otok, are three islands, their southern extremities dividing Srednji Kanal into four subordinate channels. Ostrvo Žverinac, the southwestern of the three, is 3 miles long and rises to 384 feet near its southern end. Ostrvo Tun Veli, the middle island, which with Otočić Tun Mali form the narrows of the passage, is 2 miles long and 413 feet high. A light is shown from the northwestern point of Ostrvo Tun Veli. The northeastern of the group, Ostrvo Sestrunj, is also the largest, being 6 miles long and 610 feet high.

11A-59 Dangers.—Otočići Lagniči have been described in section 11A-58. The light in Uvala Lučina which is visible only between the bearings of 050° and 057°, leads clear northwestward of these rocks.

Pličina Bonaster with a depth of 21 feet lies 500 yards east-southeastward of Rt Bonaster. A rocky patch with a depth of 36 feet lies 1,200 yards farther southwestward. Both Pličina Bonaster and the rocky patch are covered by the light in Uvala Lučina between the bearings of 050° and 057°. Pličina Bonaster is covered by the red sector of Tun Veli Light bearing more than 099°, but the rocky patch lies in the white sector of Tun Veli Light between bearings of 092° and 099°.

Otocic Vrtlac, 16 feet high and marked by a light, lies 0.6 mile westward of Rt Kriz, the northern extremity of Ostrvo Sestrunj. Shoals extends about 400 yards northwestward from the islet. The islet and shoal are covered by the red sector of Tun Veli Light bearing more than 223°.

A reef extends about 400 yards westward from a position about 700 yards south-southwestward of Rt Križ, on Ostrvo Sestrunj. It is similarly covered by the red sector of Tun Veli Light.

Otočići Kamenjak, 26 feet high, and Trata, 13 feet high, are two islets rising from a connecting shoal situated 800 yards eastward of Stopanji Rt, on Ostrvo Molat. A light is shown on Otocic Trata.

A patch of 32 feet lies about 600 yards west-northwestward of Otočić Vrtlac. Farther westward and about 600 yards offshore there is a patch with 30 feet of water. The former lies in the white sector of Tun Veli Light between the bearings of 213° and 233°, but the latter is covered by the red sector.

Current.—The flood current flows eastward through the narrows at a velocity of about 2.5 knots, meeting the northward flowing current from Srednji Kanal at Otočić Vrtlac, forming eddies. The ebb current flows westward but does not exceed a velocity of 1.5 knots.

11A-60 Directions for navigating Prolaz Maknare.—A vessel entering Prolaz Maknare from westward should, from a position not less than 3 miles westward of Rt Bonaster, bring the southern extremity of Otočić Tun Mali in range with the northern extremity of Ostrvo Tun Veli, bearing 090°. This course leads between Otočić Golac and the rocky 36-foot patch southward of Rt Bonaster.

At night, the light on Veli Rat, which is visible for a considerable distance, indicates the position of Prolaz Maknare, and from closer inshore the lights, also, of Uvala Lučina and Ostrvo Tun Veli. The white sector of the light on Ostrvo Tun Veli shows between the bearings of 092° and 099°, and leads clear southward of Pličina Bonaster. If a vessel desires to avoid the 36-foot rocky patch southward of Rt Bonaster she may pass southward or northward of the patch by keeping close to the margins of the white sector, avoiding a bearing 097° of the light.

Prolaz Velo žaplo should be passed in mid-channel between Otočić Tun Mali and Ostrvo Tun Veli. When through this passage, the northwestern extremities of Ostrvi Žverinac and Tun Veli should be brought in range astern, bearing 216°, to lead between Otocici Vrtlac and Trata. Careful (Continued on next page.)

attention must be given to the current in this part of the passage. After clearing Prolaz Velo Žaplo a vessel may pass between Otočić Vrtlac and Rt Križ on Ostrvo Sestrunj in deeper water. If this route is pursued attention must be given to the heavy rips during the rising tide and to avoid the reef south-southwestward of Rt Križ.

At night, after clearing Prolaz Velo Žaplo, a vessel should steer for the light on Ostrvo Vir (sec. 11B-6), bearing 038°, keeping in the white sector, when abeam of Otočić Vrtlac, of the light on Ostrvo Tun Veli between the bearings of 213° and 233°. The 32-foot patch west-northwestward of Otočić Vrtlac lies in this sector and should be avoided by vessels of deep draft. When the southeasternmost islet of Otočići Tri Sestrice, or the light thereon (sec. 11A-62), situated $3\frac{1}{2}$ miles southeastward of Rt Križ, bears 140°, the ship is clear of the dangers lying northeastward of Stopanji Rt, the outermost being Otočić Bivošćak, 26 feet high, bare and light of color, situated a little more than 1 mile northeastward of Stopanji Rt.

11A-61 Luka Solišćica lies on the southern side of the western entrance to Prolaz Maknare between Rt Oključić, the eastern point of the hook forming the northwestern extremity of Dugi Otok and the peninsula forming the northern extremity of the same island and which terminates at Rt Borji. The bay is about 2 miles long and 1 mile wide at its entrance. With the exception of the extreme head of the bay, where is located the village and boat harbor of Soline, and a shoal spit extending from Rt Oključić the bay has depths of 8 to 35 fathoms and steep-to shores. Anchorage over good holding sand exists everywhere in the bay.

Pličina Oključić, a sand and rock spit, extends nearly 0.6 mile southeastward from Rt Oključić, which though low stands out against the pale green color of the water over the spit. A black conical buoy surmounted with a cone is moored near the extremity of

the spit. The buoy should be left to starboard when entering the gulf and should be given a wide berth. Otocic Baricevac, 26 feet high, lies close off Rt Kobiljak, the northeastern point of a peninsula about 1 mile long that separates Luka Soliscica and Zaliv Pantera. A sand bar connects Plicina Okljucic with Otocic Baricevac, over which at the middle there is a depth of 26 feet. Tanki Rt, the northwestern point of the peninsula previously mentioned, is marked by a light.

Zaliv Pantera lies eastward of the hook forming the northwestern extremity of Dugi Otok. It consists of a bay about 0.6 mile in diameter with depths, clear of the shore's bordering shoal, of 5 to 9 fathoms. The bay is entered between the buoy marking Pličina Oključić and Tanki Rt. The bay opens southeastward to Uvala Čuna through a narrow shallow passage where is situated the village of Veli Rat. There is good anchorage in Zaliv Pantera.

Brguljski Zaliv is a bay about $2\frac{1}{2}$ miles long in the southwestern side of Ostrvo Molat and is entered from Prolaz Maknare directly eastward of Rt Bonaster. It has deep water and is free of hidden dangers except for a detached patch of 39 feet closely off-lying the northeastern shore and a shoal connecting Otočić Brguljski to the main island on the eastern side of the head of the bay. There is a small craft harbor in Uvala Lučina on the southeastern side of the bay. The light at this harbor is mentioned in section 11A-58. Anchorage may be taken almost anywhere as convenient, but a recommended berth for a large vessel lies in about 22 fathoms over good holding sand, 700 yards southward of Otočić Brguljski.

CHANNELS AT THE NORTHWESTERN END OF SREDNJI KANAL

11A-62 There are five channels at the northwestern end of Srednji Kanal leading

to the waters farther northwestward. Veli Ždrelac, the easternmost, and Rivanjski Kanal lead into the northwestern end of Zadaraki Kanal. Sestrunjski Kanal, the middle channel, leads into the eastern approach of Prolaz Maknare. Tunski Kanal, and Žverinački Kanal, the westernmost, lead into the southern side of Prolaz Maknare.

VELI ŽDRELAC

11A-63 The northwestern end of Ostrvo Ugljan is separated from Ostrvo Rivanj by Veli Ždrelac, a passage which is 450 yards wide at its narrowest part and has a least depth of 8.8m (29 ft.) in the fairway. A submarine cable is laid between the southeastern side of Ostrvo Rivanj and the northern end of Ostrvo Ugljan. Another submarine cable is laid between the southwestern side of Ostrvo Rivanj and the southeastern side of Ostrvo Sestrunj. It is entered from southward between Rt Ovojak (44°08'N., 15°04'E.), a point on the northwestern shore of Ostrvo Ugljan, 1 1/2 miles southward of Rt Sveti Petar (sec. 11A-37), on its eastern side, and the southeastern extremity of Ostrvo Rivanj, on its western side. Otočić Jidula lies 500 yards northwestward of Rt Sveti Petar. Ostrvo Rivanj, 376 feet high and mostly covered with shrubs, but partly cultivated, lies with Rt Trogric, its northern extremity, 1 1/4 miles west-northwestward of Otočić Jidula. The village of Rivanj and a chapel, both situated near the summit of the island, are conspicuous. The village and boat harbor of Moline lie at the head of a bight at the southeastern side of the southern entrance of the channel.

Directions for Veli Ždrelac.—Vessels should keep in the middle of the channel and pass westward and northward of Otočić Jidula. A depth of 22 feet can be carried in the narrow fairway between Rt Sveti Petar and Otočić Jidula. Currents are strong sometimes in this channel. Care must be given to avoid Pličina Sajda (sec. 11A-64) lying northward of the northern entrance.

RIVANJSKI KANAL

11A-64 Rivanjski Kanal, about 800 yards wide at its narrowest part, lies between Ostrvo Sestrunj, on its southwestern side, and Ostrvo Rivanj with the Otočići Tri

Sestrice, on its northeastern side. The channel is entered from southeastward between two islets off-lying Rt Mavrovica, the southern extremity of Ostrvo Sestrunj, and the southern extremity of Ostrvo Rivanj. The shores of both islands in the channel are bordered by a narrow shoal nowhere extending farther than 150 yards offshore. A light is shown from the following: Rt Trska on the eastern side of Ostrvo Sestrunj; head of the mole at Rivanj Harbor; Rt Zanavin on northwestern point of Ostrvo Rivanj. On the northeastern side of Rivanjski Kanal, Otočići Tri Sestrice, of which the northwesternmost is 82 feet high, the middle, 75 feet, and the southeasternmost, 33 feet high, lie off Rt Zanavin, the northwestern point of Ostrvo Rivanj, the outermost at a distance of about 2 miles. The islets are covered with brushwood and are of dark aspect. A light is shown from the northeastern point of the southeasternmost of the islets (44°10' N., 15°01' E.); a fog signal is sounded at the lighthouse.

A submarine cable extends in an easterly and south-southeasterly direction to Ostrvo Ugljan from a point about 3/4 mile north-northeastward of Rt Mavrovica.

Dangers.—Pličina Sajda, with a depth of less than 4.5m (15 ft.) and steep-to, lies about 1 mile northeastward of Rt Trogric. A light marks the shoal, which is also covered by the red sector of Tri Sestrice Light between the bearings of 225° and 234°. This buoy is carried away often by seas. The shoal lies on the range of Rt Zanavin and the church of Sveti Petar, the eastern of two churches in the town of Sestrunj on the island of the same name, bearing 031°–211°.

A shoal with a depth of 8.8m (29 ft.) lies 675 yards northward of Tri Sestrice Lighthouse.

A rock which breaks lies about 800 yards northwestward of the northwesternmost Otočići Tri Sestrice and is marked by a can buoy, painted in red and black horizontal bands.

A rock with 5.5m (18 ft.) of water lies about 1 mile northwestward of the rock just mentioned and about 1/3 mile off Rt Kriz.

Submarine cable.—A submarine cable is laid across the eastern part of the canal.

Current.—The tidal current in Rivanjski Kanal may, at springs, attain a velocity of 4 knots.

Anchorage.—Several anchorage berths of at least 600 yards in diameter in from 16.5m (9 fm) to 28m (15 fm) over sand lie southwestward of the two northern Otočići Tri Sestrice.

Directions for Rivanjski Kanal.—Vessels proceeding through Rivanjski Kanal should navigate in midchannel where no dangers exist. Vessels bound either to or from Zadaraki Kanal may use the passage between the southeasternmost Otočići Tri Sestrice on the northwestern side and Rt Zanavin and Rt Trogrić on the southeastern, keeping to the middle of the passage. A bearing of 011°–191° maintained on Obručar, the summit of Ostrvo Sestrunj, leads clear of the dangers between Otočići Tri Sestrice and Rt Križ.

SESTRUNJSKI KANAL

11A-65 Sestrunjski Kanal leads from the northwestern end of Srednji Kanal to the eastern approach of Prolaz Maknare between Ostrvo Sestrunj, on its northeastern side, and Ostrvo Tun Veli, on its southwestern. It has a minimum width of about $\frac{3}{4}$ mile and a least depth in the fairway of 33m (18 fm). Sestrunjski Kanal, in common with Tunski Kanal, is entered from southeastward between Južni Rt (44°09' N., 14°57' E.), the southeastern extremity of Ostrvo Žverinac and Rt Duboški, a point at about the middle of the southwestern shore of Ostrvo Sestrunj, 1 $\frac{1}{4}$ miles northeastward. A 7.9m (26 ft.) patch lies 500 yards northwestward of Rt Duboški and about 400 yards southwestward from a projection which separates two coves. Ostrvo Tun Veli, which lies in the middle of the common channel, forms the southwestern shore of Sestrunjski Kanal northwestward of Rt Veli Bok, its southeastern extremity.

Current.—The flood current flows northwestward at a velocity of about 2.5 knots

meeting the east-going flood of Prolaz Maknare at Otočić Vrtlac (sec. 11A-59). The southeast-going ebb current does not exceed 1.5 knots.

Directions for Sestrunjski Kanal.—A vessel approaching from southeastward should pass Rt Mavrovica and the southwestern shore of Ostrvo Sestrunj about $\frac{1}{2}$ mile offshore until abeam to southwestward of Rt Duboški, thence course should be shaped to pass in midchannel between Ostrvi Sestrunj and Tun Veli. For the northwestern end of Sestrunjski Kanal, the dangers and directions for Prolaz Maknare described in sections 11A-59 and 11A-60 should be consulted.

TUNSKI KANAL

11A-66 Tunski Kanal is entered from southeastward similarly as is Sestrunjski Kanal between Južni Rt, on its southwestern side, and Rt Duboški, on its northeastern, but at Rt Veli Bok it turns more westward between Ostrvi Tun Veli and Žverinac, and leads into the southern side of Prolaz Maknare. It has a minimum width of a little more than $\frac{1}{2}$ mile, a fairway depth of about 59m (32 fm), and is free of dangers.

Directions for Tunski Kanal.—A vessel approaching from southeastward should follow the initial directions for Sestrunjski Kanal, but, when abeam to southwestward of Rt Duboški, should lay a midchannel course between Ostrvi Tun Veli and Žverinac. For the northwestern end of the channel, the dangers and directions for Prolaz Maknare described in sections 11A-59 and 11A-60 should be consulted.

ŽVERINAČKI KANAL

11A-67 Žverinački Kanal lies between Ostrvo Žverinac, on its northeastern side, and the northern part of Dugi Otok, on its southwestern side. The western half of its northern end is encumbered with dan-

gerous rocks and reefs. A vessel keeping to the northeastern side of this part of the channel will find a minimum depth of 19 fathoms except for a detached 29-foot patch, which can be avoided with care.

Off-lying Južni Rt to westward and south-southeastward, respectively, are two islets which are connected to the point by a shoal having depths between 16 and 45 feet. Otočić Sparešnjak, 52 feet high, lies farthest offshore of the two in a position about $\frac{1}{2}$ mile south-southeastward of Južni Rt.

Rt Sveta Nedelja ($44^{\circ}08' N.$, $14^{\circ}55' E.$), marked by a light and having a conspicuous chapel on it, extends eastward from the shore of Dugi Otok at a position $1\frac{1}{2}$ miles westward of Južni Rt. At the head of a cove close southwestward of Rt Sveta Nedelja is the quayed harbor for small craft of the village of Božava. Rt Kruna is a rounded point about 1 mile northwestward of Rt Sveta Nedelja, and about 1 mile farther northwestward, Rt Zaglavić protrudes prominently 400 yards northeastward. The rocks and reefs previously mentioned lie off the shore of Dugi Otok between Rt Zaglavić and Rt Borji, the northeastern extremity of Dugi Otok, about $1\frac{1}{2}$ miles northwestward.

The northeastern shore of Dugi Otok, between Rt Kamičina (sec. 11A-54) and Rt Sveta Nedelja, $5\frac{1}{2}$ miles northwestward, forms the southwestern side of the south-eastern approach to Žverinački Kanal, and is also the northwestern shore of the northern part of Srednji Kanal. Rt Kamičina is the eastern point of a peninsula, 472 feet high, which extends about $\frac{3}{4}$ mile northwestward. Uvala Lučina is formed between the peninsula and the shore of Dugi Otok. The entrance to Uvala Lučina is divided into two passages by Otočić Utra, 157 feet high. The shore between Rt Kamičina and Rt Sveta Nedelja recedes to form two bights between those two salient points and a headland midway between them. Several islets and shoals front

this stretch of coast, but no dangers exist northeastward of a line joining Rt Kamičina and Rt Sveta Nedelja.

11A-68 Directions for Žverinački Kanal.—Vessels approaching from southeastward and content to pass over the 29-foot patch should close the southwestern shore of Ostrvo Žverinac to a distance of about 600 yards, until Rt Kruna bears about 180° , but not less, thence the northwestern shore of Ostrvo Žverinac should be closed immediately to a distance of 300 yards and so paralleled until clear as described below.

Vessels from southeastward desiring the greatest depth, about 10 to 15 fathoms, should, from a position about $\frac{1}{2}$ mile west-southwestward of Otočić Sparešnjak, close the shore of Dugi Otok between Rt Sveta Nedelja and Rt Kruna to a distance of 400 yards. As the vessel draws northward of Rt Kruna, that point should be brought dead astern bearing 180° , closing the northwestern shore of Ostrvo Žverinac, which is steep-to, to a distance of 300 yards and so proceed northwestward parallel to it. The eastern extremity of Rt Bonaster (sec. 11A-58) bearing 315° clears the dangers to southwestward. For the northwestern end of the channel, the dangers and directions for Pro-laz Maknare described in sections 11A-59 and 11A-60 should be consulted.

ANCHORAGES

11A-67 Uvala Movar.—Section 11A-4.

Luka Rogoznica.—Section 11A-4.

Luka Primošten.—Section 11A-5.

Luka Grebaštica.—Section 11-5.

Kakanski Kanal.—Section 11A-7.

Šibenički Kanal.—Section 11A-12.

Luka Šibenik.—Section 11A-19.

Prokljansko Jezero.—Section 11A-26.

Pašmanski-Zadarski Kanal.—Section 11A-38.

Luka Zadar.—Section 11A-43.

Lavdarski Kanal.—Section 11A-53.

Ravski Kanal (Uvala Luka).—Section 11A-55.

Luka Solišćica.—Section 11A-61.

Zaliv Pantera.—Section 11A-61.

Brguljski Zaliv.—Section 11A-61.

Rivanjski Kanal.—Section 11A-64.

PART B. RT SKALA TO RT ŠTOKIĆ, INCLUDING OFF-LYING ISLANDS AND CHANNELS

11B-1 Rt Skala ($44^{\circ}12' N.$, $15^{\circ}09' E.$), the northeastern entrance point of Zadarski Kanal, is situated on the mainland, 5 miles north-northwestward of Oštri Rat.

GENERAL FEATURES

11B-2 The mainland coast trends northward 5 miles from Rt Skala, thence irregularly eastward about 17 miles, with bays and points of land, which, with close off-lying Ostrvo Pag, form narrow channels. From the latter position at the southern end of Velebitski Kanal near Rt Pisak, the steep-to mainland coast stretches in a gentle curve about 38 miles north-northwestward to Rt Štokić, close northward of Luka Jablanac. The rocky coast rises to mountainous summits about 3 miles inland, increasing in height northwestward from Rt Pisak, where inland of Rt Štokić, about midway to Riječka-Sušačka Luka, they attain their highest altitude of 5,374 feet.

The southern part of Velebitski Kanal lies between the mainland, on its northeastern side, and Ostrvo Pag, on its southwestern side.

The southern part of Mali Kvarner, in which are many islands, islets, and rocks, with communicating channels between, lies between Ostrvo Pag, on its northeastern side, and the outermost off-lying islands, the principal of which are Molat, Ist, Škarda, Premuda, Lošinj, and Cres.

The features included in Part B of this chapter are described in the following order:

Firstly.—Rt Skala to Ljubačka Vrata, thence Velebitski (Planinski) Kanal south-eastward to the inland bays, followed by Velebitski Kanal northwestward from Ljubačka Vrata to Rt Štokić. Sections 11B-6 to 11B-13.

Secondly.—The southwestern islands and islets of Molat, Ist, Škarda, Premuda, Plovik, Grujica, Silba, Olib, and the southern side of Lošinj, and their adjacent channels. Sections 11B-14 to 11B-21.

Thirdly.—The southeastern islands of Planik, Maun, Škrda, and the southwestern side of Pag, and their adjacent channels. Sections 11B-22 to 11B-24.

Fourthly.—The northeastern group of Otočići Laganj and Dolfín, the northwestern side of Ostrvo Pag and the western side of Ostrvo Rab, including Paški and Barbatski Kanal. Sections 11B-25 to 11B-38.

Fifthly.—The northwestern group of Otočić Oruda, the eastern side of Ostrvo Lošinj and the southern and southeastern side of Ostrvo Cres, including Lošinjski Kanal. Sections 11B-39 to 11B-42.

OFF-LYING DANGERS

11B-3 Some rocks and reefs lie seaward of the islands between Veli Rat (sec. 11A-58) and the northern end of Ostrvo Premuda (sec. 11B-18), 16 miles northwestward. A bearing of 134° or less on Veli Rat Light-house, or a bearing of 314° or greater on Ostrvo Susak Lighthouse (sec. 11D-1), about 31 miles northwestward, leads clear seaward of all intervening dangers.

CURRENT AND WIND

11B-4 Current.—Under normal conditions the coastal current is affected by a slight tidal current, the northwesterly being in the order of 1 knot and the southeasterly being weak. The influence of the wind on

the current is dependent upon its duration, direction, and strength. When the wind is strong and of duration it will increase the tidal current in its direction through the narrower channels sufficiently to warrant careful attention to navigation, particularly since the time of change becomes irregular.

Wind.—The winds and weather in Velebitski Kanal and in Mali Kvarner are those prevailing generally in the Gulf of Quarnaro. Local variations of the common pattern will be described in the appropriate sections of this part of the chapter.

The high land of the northeastern shore of Velebitski Kanal produces violent bora squalls rendering navigation dangerous, especially since there are few tolerable anchorages. Small vessels usually hug the northeastern shore so that refuge can be obtained quickly in its coves and never remain underway at night during winter.

The bora blows usually violently in Mali Kvarner but shelter can be found at times to leeward of some of the islands.

The scirocco blows stronger in the northern part of Mali Kvarner than in the southern.

The summer land breeze blows from the east and the sea breeze from the northwest. Often in place of the sea breeze there are variable light airs and calms, most particularly in the southern part of Mali Kvarner. Calms are rare near Ostrvo Rab where local variable winds are frequent.

GENERAL DESCRIPTION—RT SKALA TO OSTRVO RAB

11B-5 The southeastern part of Velebitski Kanal lies between the mainland coast, on its northeastern side, and a peninsula of the mainland and Ostrvo Pag, on its southwestern side. Ostrvo Pag, which also forms the northeastern shore of the southern part of Mali Kvarner, is an island about 32 miles long varying from 1 to 5 miles wide, the

narrowest part being at the northwestern extremity. It consists of a central rocky ridge with two northeasterly portions separated by a low valley from the main part. Sveti Vid, on which there is a chapel conspicuous from afar, is the summit, 1,142 feet high, located at about the middle of the island. The northeastern part is abrupt and bare, and for the most part steep-to.

Kanal Nove Poveljane (Poveljanski Kanal) leads into several bays and narrow channels having a controlling depth of about 26 feet between the southern side of Ostrvo Pag and the mainland, and provides communication between the southeastern end of Mali Kvarner and Velebitski Kanal at a position about 13 miles from its southeastern extremity.

Maslenički Kanal, a narrow deep water channel, leads from the southeastern extremity of Velebitski Kanal into Novigradsko More, a land locked bay about $5\frac{1}{2}$ miles long. Karinsko More, a smaller bay, is entered southeastward from the former.

Paški Kanal, lying between the northern extremity of Ostrvo Pag and Ostrvo Rab, 3 miles northeastward, provides communication between Velebitski Kanal and the northern part of Mali Kvarner.

LANDMARKS—COASTAL FEATURES

11B-6 Sidrište Zaton, a bight indented by numerous coves, is situated between Rt Skala and Rt Artić, 4 miles north-northwestward. A shoal with a depth of less than 6 fathoms closely fronts the southeastern shore but widens to an offshore distance of 800 yards at the northeastern shore. Several detached patches with depths of $4\frac{1}{2}$ to 9 fathoms lie between $1\frac{1}{4}$ and $2\frac{1}{2}$ miles northwestward of Rt Skala. Rt Radman in range with the southwestern side of Rt Skala, bearing about 146° – 326° , clears the patches to northeastward. Sidrište Zaton provides ample anchorage berths for large vessels in $6\frac{1}{2}$ to 13 fathoms.

Ostrvo Vir, an island about $5\frac{1}{2}$ miles long, is situated close northwestward of a peninsula, of which **Rt Artić** is the westernmost point. From westward and northwestward the island appears as a bare hill with two summits, the highest 381 feet, which slope gently to the sea. The southeastern part of the island is low and partially cultivated. A light is shown from the southwestern shore of the island, about $1\frac{1}{2}$ miles southward of **Rt Vir** ($44^{\circ}20' N.$, $15^{\circ}01' E.$), the northwestern point of the island. A fog signal is sounded at the lighthouse. A shoal with a depth of $6\frac{1}{2}$ fathoms lies about 1 mile north-northeastward of **Rt Vir**.

Sidrište Privlaka is formed between **Rt Artić** and **Rt Kozjak**, a point on the southern shore of **Ostrvo Vir**. A lighted buoy lies west-southwestward of **Rt Artić**, on the extremity of the shoal bordering **Rt Artić**. The 6-fathom curve lies between 350 yards and $1\frac{1}{2}$ mile offshore, but the bay will accommodate about four large vessels at anchor in depths of from 6 to 10 fathoms. **Privlački Tesnac** is a boat channel about 30 yards wide and about 1 mile long between the mainland and the southeastern side of **Ostrvo Vir** which connects **Sidrište Privlaka** and the southeastern end of **Kanal Nove Poveljane**. Depths in this channel are changing constantly. A light is shown on the head of a mole at **Privlaka** on the southeastern side of **Sidrište Privlaka**.

Kanal Nove Poveljane is entered from northwestward between **Ostrvo Vir**, on its southwestern side, and **Rt Hrastova** ($44^{\circ}21' N.$, $15^{\circ}06' E.$), on **Ostrvo Pag**, on its northeastern side. The channel is nearly $\frac{3}{4}$ mile wide and has depths of 6 to 16 fathoms at its northwestern end. The southeastern end of the channel is obstructed by **Pličina Rtina** with a depth of 13 feet which extends northeastward from the southeastern end of **Ostrvo Vir**, and by **Pličina Prutna**, a reef which extends southward and westward toward **Pličina Rtina** from **Rt Prutna**, the southwestern point of **Ostrvo Pag**. **Rt Prutna** is marked by a light. The western extremity of **Pličina Prutna** is marked by a light, and the northeastern extremity of **Pličina Rtina** is marked by a lighted black buoy. There is a

depth of 26 feet in the fairway between the light structure and the buoy. A light is shown in the water close off a point about $2\frac{1}{4}$ miles northwestward of **Pličina Prutna Light**.

Anchorage is prohibited between **Plicina Prutna** and the mainland south-southwestward because of submarine cables.

11B-7 Bays between Kanal Nove Poveljane and Velebitaki Kanal.—Ninski Zaliv, about 2 miles long and $1\frac{1}{2}$ miles wide, lies between the shores of the mainland at the southeastern end of **Kanal Nove Poveljane**. Its shores are bordered by a shoal with depths of less than 6 fathoms for a distance of 1,200 yards on the southern and southwestern sides.

Uvala Stara Poveljana, a bay $2\frac{1}{2}$ miles long and 1 mile wide, at the southwestern end of **Ostrvo Pag**, is entered from southwestward between **Rt Prutna**, on the northwestern side, and **Rt Jesenovo** on the mainland $\frac{3}{4}$ mile southeastward, and a peninsula with a close off-lying islet, **Otočić Mišnjak**, a little more than $\frac{1}{2}$ mile northeastward, on the southeastern side. **Otočić Misnjac** is marked by a light. Both sides of the fairway between **Rt Prutna** and **Rt Jesenovo** are marked by buoys.

Ljubački Zaliv, $2\frac{1}{2}$ miles wide, lies between the shores of the mainland and is entered from **Uvala Stara Poveljana** from northwestward between **Otočić Mišnjak** and **Otočić Čikovac**, the outermost of two islets off-lying a point on **Ostrvo Pag**, about 2 miles eastward. **Otočić Čikovac**, marked by a light, is fringed by a 3-fathom bank to a distance of about 200 yards from the shore. A sunken rock lies off the southeastern side of an island close northwestward of **Otočić Čikovac**. **Ljubački Zaliv** is divided at its southeastern side into two coves with rocks and shallow water at their heads.

Uvala Dinjiška, a narrow inlet, 4 miles long, is entered from the northern part of **Ljubački Zaliv** between **Rt Ljubač**, the southeastern extremity of **Ostrvo Pag**, and **Rt Merta**, 1 mile west-southwestward. The northwestern half of **Uvala Dinjiška** is shoal and passable by boats only.

Anchorage.—Large vessels can anchor in about 12.8m (7 fm) over mud in the southeastern part of Ninski Zaliv, and in about 40m (22 fm) over mud in Uvala Dinjska, about 1 1/4 miles within its entrance. Small vessels can anchor almost anywhere in the coves and in the heads of the bays.

Ljubačka Vrata, a winding passage about 3/4 mile long and 220 yards wide at its narrowest part, provides deep water access between Ljubački Zaliv and Velebitski Kanal at a position about 18 miles northwestward of the southeastern end of the channel. The shores of the passage are cliffy and steep-to, but Rt Tanka Nožica, its northeastern entrance point, is fronted by shoal water for 300 yards northward. A light is shown on the point. The passage is entered from southward between Rt Ljubac and Rt Oštoljak, 350 yards northeastward. The latter point is marked by a light.

A southerly current of about 1 knot prevails usually in the passage but at times it may increase to 3 knots.

Navigation regulations for Ljubačka Vrata.—Before entering in clear weather, a vessel must sound one long blast. The vessel which first sounds this signal has the prior right of entry and all others must wait outside. A vessel navigating the passage must answer the single long blast of another vessel by at least four short blasts. In dark or foggy weather, special fog signals are used instead of the above described signals.

VELEBITSKI KANAL SOUTH OF RT DUGA

11B-8 The southeastern part of Velebitski Kanal, from Rt Debela Nožica, 1/2 mile eastward of Rt Tanka Nožica (sec. 11B-7), and Rt Duga, 1 3/4 miles northeastward, to the entrance into Maslenički Kanal is 11 1/2 miles long, and narrows to a width of 3/4 mile at Rt Pisak. The southwestern side of this part of the channel is backed by hills from 144 to 820 feet high which slope gradually to the channel, in contrast to the high precipitous shore of the opposite side. The

mountains recede in the southeastern part leaving a level area which is cultivated.

The northeastern shore between Rt Duga (44°21' N., 15°19' E.) and Luka Starigrad, 6 1/2 miles southeastward, is steep-to except for a stretch of closely bordering shoals extending 3/4 mile northwestward and 1 mile southeastward from Rt Šibuljina, situated 1 1/2 miles southeastward of Rt Duga. A rock with a depth of 3.6m (12 ft.) lies about 1 1/4 miles northwestward of Rt Šibuljina and 400 yards offshore. Rt Duga is marked by a light. The village and port of call for local steamers of Kruscia lies close eastward of Rt Duga. A conspicuous chapel in the village of Tribanj stands on Rt Šibuljina. At Luka Starigrad there is a quay for local steamers protected by a breakwater which is marked by a light.

The southwestern shore between Rt Debela Nožica and Rt Jstocnjel, 8 miles southeastward, is closely bordered by a shoal which at Hrid Orlić, 3/4 mile southeastward of Rt Debela Nožica, and at Uvala Dragunica, 2 3/4 miles farther southeastward, extends as far as 1/2 mile offshore. The village and small craft harbor of Ražanac lies about 1 mile southeastward of Uvala Dragunica; the harbor breakwater is marked by a light.

Otočići Ražanci are three islets lying in the middle of the channel with the largest and easternmost, Otočić Ražanac Veli which is marked on its southeastern side by a light, situated 1 1/2 miles south-southeastward of Rt Šibuljina. A conspicuous statue of a saint stands on the highest point of the islet. The two eastern islets lie on a shoal about 1/2 mile in diameter with a depth of 4.9m (16 ft.). A detached 6.4m (21 ft.) patch lies 600 yards southward of the eastern end of the western islet. These islets are dangerous to navigation in reduced visibility as they are difficult to distinguish.

The northeastern shore of Velebitski Kanal between Luka Starigrad and the southeastern extremity of the channel, 5 miles southeastward, consists of two low points of land, Rt Stara Kula 1 mile southward of Luka Starigrad, and Rt Pisak, 1 1/4 miles farther southeastward. Rt Stara

Kula is bordered southward and westward by a reef 600 yards wide and is marked at its southern extremity by a lighted red buoy. Rt Pisak which is covered with olive trees is bordered closely westward and eastward by a reef. From Rt Pisak the shore curves in a bight eastward and southward to the northern entrance to Maslenicki Kanal, $2\frac{1}{4}$ miles east-southeastward.

The southwestern shore of the channel between Rt Jstocnjel and the northern entrance of Maslenički Kanal, $3\frac{1}{2}$ miles east-southeastward, is bordered by detached reefs extending about 720 yards offshore. Pličina Stanga with a depth of 1.5m (5 ft.) is the westernmost of the patches situated about $\frac{1}{2}$ mile northwestward of Luka Vinjerac. This reef is marked near its northern side by a black pole beacon, surmounted by two cones, points up, standing in 2.4m (8 ft.) of water. A 5.5m (3 fm) patch lies about 400 yards south-eastward of Pličina Stanga. Luka Vinjerac lies about 1 mile east-southeastward of Rt Jstocnjel and consists of a small bay and jetty protected by a breakwater. There is an anchorage berth, 100 yards in diameter, in the bay in 5.8m (19 ft.) of water over good holding mud and sand. A light is shown from the head of the breakwater at Luka Vinjerac. A light is located on the opposite bank at Rt Pisak. To avoid Pličina Stanga, a vessel approaching Luka Vinjerac from northwestward should keep in the white sector of the breakwater light between the bearings of 116° and 129° . When approaching from eastward and from a position northward of the off-lying detached reefs, a vessel should alter course for the light when it changes from white to red, or between the bearings of 169° and 189° .

BAYS AND CHANNELS AT SOUTHERN END OF VELEBITSKI KANAL

11B-9 Maslenički Kanal is entered from the southeastern extremity of Velebitski Kanal between Rt Baljenica ($44^\circ 15' N.$, $15^\circ 32' E.$) to eastward, and Rt Korotanja, the western entrance point, about $\frac{1}{4}$ mile south-southwestward. A light is shown from each point. Rt Baljenica is conspicuous, being bare and of brownish yellow color backed by brush covered hills. Prominent ruins stand on a hill, 653 feet high, about $1\frac{1}{2}$ miles southeastward. The channel is nearly 2 miles long and has a minimum width of about 200 yards. There are depths of from 18.3m (10 fm) to 33m (18 fm) throughout to within a few yards of the shores which are from 50

to 100 feet high rising inland to about 350 feet. A rock nearly awash lies 45 yards from the western shore about 400 yards northwestward of Rt Zdriac, the southwestern entrance point. A light is shown from Rt Zdriac, and two additional lights mark the canal to northward. The northern entrance is encumbered by a shoal with about 7.9m (26 ft.) of water extending about 600 yards west-northwestward from Rt Baljenica.

A bridge, with a clearance of 180 feet, spans the canal, about $\frac{1}{2}$ mile northward of its southern end.

It was reported (1961) that a mooring buoy lies close to the eastern shore at the southern end of the canal where there is a deep-water berth for vessels loading iron ore.

Pilotage.—Pilotage is compulsory in the Maslenicki Kanal. The services of a pilot should be requested from the harbormaster at Zadar 24 hours before arrival. Pilots are available by day only and are picked up and dropped about $\frac{1}{2}$ mile from Rt Baljenica.

In summer, northerly winds prevail in the channel during the day, and southerly winds during the night. Under normal conditions the current is northerly with a velocity of about 1 knot, but during southerly and southeasterly winds and after heavy rains the velocity may increase considerably.

Novigradsko More is an inland bay, 6 miles long and $2\frac{1}{2}$ miles wide at its widest part, entered through Maslenički Kanal at its northern side. Except for a closely bordering shoal and two more extensive ones at Otočić Žališće and at the mouth of Rijeka Zrmanja on the northeastern side there are depths of from 12.8m (7 fm) to 29m (16 fm) over mud. The bay abounds in shell fish and tunny.

Uvala Posedarje is a shallow cove at the western side of the bay. The village of Posedarje with a conspicuous chapel and a small craft harbor is located on the northern side of the cove. A light buoy is moored about $\frac{1}{4}$ mile east-southeastward of the head of a small breakwater in the cove.

Luka Novigrad on the southern side of the bay is a narrow inlet with depths of about 16.5 m (9 fm) decreasing to about 1.8m (6 ft.) at its head. The town of Novigrad with quays for

small craft and local steamers lies in the eastern side of the inlet near its head. A light is shown from Rt Sveti Nikola, the eastern entrance point of the inlet.

Otočić Žališće, low and flat, of light color and difficult to distinguish, lies on a bordering shoal about 300 yards wide, about $1\frac{1}{2}$ miles east-southeastward of Rt Ždrijac.

The mouth of Rijeka Zrmanja lies about 1 mile southeastward of Otocic Zalisce. A red can buoy marks Rt Rijeka the western entrance point of the river. A shallow spit extends 500 yards west-southwestward from the eastern entrance point. The outer edge is marked by a beacon. The river, from 55 to 220 yards wide, is navigable for craft up to 130 feet for a distance of about 6 miles to the village of Obrovca. The least depth in the fairway, which is marked by pole beacons, is 16 feet. The lower part of the river flows through a sheersided gorge. A vessel proceeding to Obrovca should keep exactly in the middle of the fairway marked by the beacons. Where there are no beacons, or in narrow parts of the river between steep banks, vessels should stay in the center. When beacons are on one side only, the vessel should steer between the beacons and the opposite shore, keeping about 30 yards off the beacons.

Karinski Kanal connects Novigradsko More with Karinsko More and has depths in the fairway of from 6 to 11 fathoms. The channel is about $1\frac{1}{4}$ miles long and has a width of 110 yards at Rt Ribnice, its narrowest part. There is a sharp bend at Rt Vozarica, about 1 mile south-southeastward of the northern entrance on the western side, 50 yards off which point there is a rock awash connected by a reef to the point. The shores of the channel rise gradually and are partly covered with trees. The channel is entered from northward between Rt Zečevo ($44^{\circ}11' N.$, $15^{\circ}36' E.$), 2 miles east-southeastward of Rt Sveti Nikola, to westward and the mainland, 280 yards eastward.

Karinsko More, about 2 miles long and 1 mile wide, is surrounded by hills sloping gently to the water, those on the eastern side being forested. The depth in the middle

is about 40 feet shoaling abruptly westward and eastward but gradually southward. In the southern part at the mouth of a river stands a prominent chapel surrounded by olive groves.

VELEBITSKI KANAL FROM RT DUGA TO RT STOKIĆ

11B-10 The northeastern shore of Velebitski Kanal (continued from sec. 11B-8) from Rt Duga to Luka Karlobag ($44^{\circ}31' N.$, $15^{\circ}04' E.$), nearly 15 miles northwestward, continues steep and mountainous and affords no shelter whatever except a few coves suitable for small craft only.

Hrid Konj, a low rock, closely surrounded by a reef, lies 6 miles northwestward of Rt Duga and 400 yards offshore. The rock is marked by a light. With the exception of this rock, there are no off-lying dangers along this stretch of coast.

The town of Karlobag, population about 3,000, is situated on a low peninsula, $8\frac{3}{4}$ miles northwestward of Hrid Konj. A conspicuous church with steeple stands on the point. The southwestern side of the town is quayed for about 800 feet and is protected to northward and southward, respectively, by a short quayed breakwater. Between the breakwaters is a mole, 130 feet long, which will accommodate vessels with a draft not exceeding 10 feet except near its root. There is a depth of 23 feet alongside the southern outer end of the northern breakwater. Shallow water and projections prohibit berthing at the southern breakwater. Two patches with 9 and 10 feet over them, lie $1\frac{1}{2}$ miles and $\frac{3}{4}$ mile northwestward, respectively, of the southern breakwater. The head of the southern breakwater is marked by a light.

The southwestern shore of Velebitski Kanal between Ljubačka Vrata (sec. 11B-7) and Rt Sveti Nikola, $13\frac{1}{2}$ miles northwestward, consists of the rocky, steep and barren coast of Ostrvo Pag. It is swept by the bora, and, although it contains several bights and coves, it affords no shelter whatever.

At about the middle of a bight formed between Rt Santis and Rt Čista, 4 and $5\frac{1}{2}$ miles northwestward, respectively, of Ljubačka

Vrata, a reef with depths of less than 16 feet extends about 450 yards offshore. Hridi Šestakovci are four bare low rocks lying on a reef paralleling the coast at a distance of 600 yards about $4\frac{1}{2}$ miles northwestward of Rt Čista. A narrow spit with depths 20 feet and less extends offshore about 675 yards from a position on the shore southward of Hridi Šestakovci.

Rt Sveti Nikola, the northern extremity of a projection extending from Ostrvo Pag, lies $7\frac{1}{2}$ miles northwestward of Rt Čista. Three small rocks lie close off the northeastern side of this point nearly 1 mile southeastward. Rt Sveti Nikola is marked by a light.

With the exception of the before-mentioned dangers there is none off-lying this stretch of shore.

11B-11 Paški Zaliv is a landlocked bay about $8\frac{1}{2}$ miles long, narrowing from a greatest width of about 2 miles to coves southeastward and northwestward. The bay is backed by high land, especially on the southwestern side. Depths clear of dangers range from 6 to 27 fathoms.

The bay is entered between the peninsula of Ostrvo Pag which terminates at Rt Sveti Nikola (sec. 11B-10) and the peninsula forming the southern extremity of another projection extending from the same island and terminating at Rt Krištofor ($44^{\circ}29' N.$, $15^{\circ}15' E.$), about $1\frac{1}{4}$ miles east-southeastward of Rt Sveti Nikola. Rt Krištofor is a steep rocky point having a small ruined chapel and is marked by a light. A sunken rock lies close off the southwestern side of this point. Plicina Kristofor, a reef with a depth of 11 feet, lies about 800 yards southward of Rt Kristofor on the range of Karlobag church and the eastern extremity of Rt Kristofor, bearing $175^{\circ} - 355^{\circ}$.

Both shores of the bay about 3 miles from the northwestern head are foul for some distance with reefs and rocks which are difficult to distinguish. Grebeni Karavanci consists of three above-water rocks and one sunken extending on a reef about 500 yards off the northeastern shore. Grebeni Karavanić are four small rocks, only one of which is visible, lying on a reef extending about $\frac{1}{2}$

mile off the southwestern shore. There is a passage between, about 650 yards wide, with depths over 10 fathoms. The village of Caska lies at the northwestern head of the bay.

The best anchorage in Paski Zaliv is in Drafa Barbat, a cove on the northeastern shore 4 miles northwestward of Rt Kristofor. Large vessels anchor in 21 fathoms over good holding mud and sand with weed about $\frac{1}{2}$ mile west-northwestward of the chapel in the village of Metajne. A light is shown on the eastern shore of the bay about 2 miles northwestward of Rt Sveti Nikola and close to the village of Metajne.

The town of Pag, population about 4,000 lies at the southeastern head of the bay. A salt flat, 3 miles long, occupies the valley southeastward of the town and is crossed by a bridge. The western side of the town is quayed and is approached through a channel 55 yards wide and $14\frac{1}{2}$ feet deep. Two metal barrels and a stone pillar mark the starboard side of the fairway: a wooden post surmounted by a cylinder is on the port side. The tidal current, northwest-southeast, is appreciable in the harbor, sometimes attaining a velocity of 4 knots.

A light is shown from a tower about 600 yards north-northwestward of the town of Pag.

A light is shown from a tower on the head of the south mole.

11B-12 From Rt Krištofor the southwestern shore of Velebitski Kanal trends 11 miles northwestward to Rt Koromačna; it is steep and has deep water close to almost everywhere. There are numerous coves available for small craft but none offers shelter in a bora. Several rocks lie on a reef that extends 400 yards northward from a position on the shore nearly 4 miles northwestward of Rt Krištofor. Hrid Žilen is a closely off-lying rock connected to the shore by a reef about $2\frac{1}{2}$ miles southeastward of Rt Koromačna.

Paški Kanal (sec. 11B-27) joins Velebitski Kanal from northwestward between Rt Koromačna and Rt Glavina, the southeastern extremity of Ostrvo Rab, $5\frac{3}{4}$ miles north-northwestward.

11B-13 On the northeastern shore of Velebitski Kanal, between Karlobag and Rt

Štokić ($44^{\circ}43' N.$, $14^{\circ}54' E.$), $13\frac{1}{2}$ miles northwestward, there are no places of shelter for any but small craft excepting Luka Jablanac, described below. The shore between Karlobag and a position 3 miles northwestward is closely fronted by a number of scattered rocks and reefs and should not be approached without local knowledge closer than 300 yards. Rt Jurišnica, $4\frac{1}{2}$ miles northwestward of Karlobag, is marked by a light. Pličina Prizna, part of which is awash, extends a short distance offshore 2 miles north-northwestward of Rt Jurišnica and is marked by a stone beacon. Rt Štokić, 9 miles north-northwestward of Rt Jurišnica, is marked by a light. The narrowest part of Velebitski Kanal lies between Rt Štokić and Rt Glavina (sec. 11B-38), the southeastern extremity of Ostrvo Rab, 1 mile westward.

Luka Jablanac, a small craft harbor almost completely quayed, is entered between Rt Gradić, about 440 yards southward of Rt Štokić, on the western side, and the southern extremity of the eastern quay, 65 yards eastward. Rt Gradić and the southern corner of the eastern quay are each marked by a light. A depth of about 10 feet is available alongside about 195 feet of the outer part of the eastern quay.

Directions for Velebitski Kanal.—The southeastern part of Velebitski Kanal being entirely free of off-lying dangers, excepting Otočići Ražanci described in section 11B-8, it is believed that no directions for navigating are necessary and that the eye will serve as the best guide. Vessels generally keep to the northeastern or weather side for whatever protection from the bora its higher shore provides.

SOUTHWESTERN ISLANDS AND CHANNELS IN MALI KVARNER

11B-14 General description.—The southern part of Mali Kvarner is considered to be bounded by a line joining the northeastern entrance point of Prolaz Maknare and Ostrvo Vir to southward, and a line joining Rt Koromažna, a point on the eastern shore of Ostrvo Cres, and Rt Sorinj, the northwestern extremity of Ostrvo Rab, to northward.

Ostrvi Pag and Rab form the northeastern shore of this channel. The southwestern shore is formed by Ostrvi Molat, Ist, Škarda, Premuda, Ilovik, Lošinj, and the southern part of Cres. There are a number of intervening islands and islets. The principal communicating channels are: Silbanski Kanal, between Ostrvo Premuda and Ostrvo Silba; Maunski Kanal, between Ostrvo Pag and Ostrvi Maun and Škrda; and Paški Kanal, between the northern end of Ostrvo Pag and Ostrvo Rab.

The fairway of the main channel of Mali Kvarner has deep water and is free of hidden dangers.

Submarine cables.—A submarine cable is laid across the channel from the southeastern side of Ostrvo Molat (11B-15) to a point on the mainland about $\frac{1}{3}$ mile northeastward of Rt Artic (sec. 11B-6). Three submarine cables are laid from a junction position about 1 mile northward of Ostrvo Ist (sec. 11B-16). One cable is laid in a northerly direction to the southeastern end of Ostrvo Silba (sec. 11B-20) and thence eastward to Ostrvo Olib (sec. 11B-21). A second cable is laid from the junction position to the northeastern end of Ostrvo Ist. A third cable is laid in a westerly direction and runs seaward. Another cable is laid from Uvala Loza (sec. 11B-18) northeastward to Silba (sec. 11B-20). A submarine cable is laid from the southeastern shore of Ostrvo Vir (sec. 11B-6) north-eastward to Ostrvo Pag.

11B-15 Ostrvo Molat.—The southern part of Ostrvo Molat is described in sec. 11A-58. The southwestern shore is steep-to and has several off-lying islets and reefs, the outermost and largest being Otočić Tramerka, 164 feet high, situated $1\frac{1}{4}$ miles offshore and northwestward of Rt Bonaster. Greben Bačvica, which breaks, lies $\frac{1}{2}$ mile south-eastward of Otočić Tramerka, on the range of the southwestern side of that islet and that of Rt Bonaster, bearing 115° – 295° , and should be avoided in approaching Prolaz Maknare from northwestward. The northeastern side of Ostrvo Molat is not as steep-to as the southwestern and is fronted by a

number of islets, rocks, and detached reefs. The two outermost are Otočić Tovarnjak, 79 feet high, off the southeastern end and Otočić Rižnjak, 33 feet high, off the northeastern end. No dangers exist northeastward of a line joining these two islets. Rt Vranač, the northeastern point of Ostrvo Molat, is marked by a light. Luka Jazi, a bay about $\frac{3}{4}$ mile long and wide at its mouth, is entered immediately westward of Rt Glavica, $1\frac{1}{2}$ miles northwestward of Stopanj Rt. An anchorage berth, 600 yards in diameter, lies with its center 600 yards southwestward of Otočić Tovarnjak at the mouth of Luka Jazi in 11 fathoms over rock and sand.

11B-16 Ostrvo Ist, about 2 miles in diameter, lies close northwestward of Ostrvo Molat from which it is separated by Prolaz Zapuntel. Two bays, Uvala Kusiraca to northwestward and Uvala Široka to southeastward, divide the island into two parts, each having a conical summit, which from northwestward and southeastward at a distance appear as two islands. The hills are covered with bush, that to northeastward, 571 feet high, is the higher and has a conspicuous chapel on top. The northeastern side is steep-to and free of off-lying dangers except for a rock lying 180 yards offshore about $\frac{1}{2}$ mile northwestward of Rt Jabučni ($44^{\circ}16' N.$, $14^{\circ}48' E.$), the southeastern extremity of the island. The southwestern side is also steep-to but is fronted by a number of islets and reefs, the outermost being Otočić Galiola, 26 feet high, situated a little more than 1 mile southwestward, and a reef with 22 feet of water lying $\frac{1}{2}$ mile southeastward of the islet. The small craft harbor of Ist, formed by a quayed breakwater, fronts the village of the same name at the head of Uvala Široka. The head of the breakwater is marked by a light. A shoal encumbers the middle of the entrance of Uvala Široka and is marked by a pole beacon surmounted by a ball. Uvala Kusiraca affords good anchorage with protection from southerly winds. This anchorage should be used in emergencies only as it is a fishing area. A submarine cable is landed in the northeastern part of the bay.

Prolaz Zapuntel, the passage between Ostrvi Molat to southeastward and Ist to northwestward, has a depth of 19 feet in a channel about 40 yards wide at its southwestern entrance. The northeastern entrance between Rt Vranač and Rt Jabučni is about 220 yards wide and has a depth of 13 fathoms. Luka Zapuntel, a bay contained between the two entrances, is about 460 yards in diameter clear of the bordering shoals and has depths of $6\frac{1}{2}$ to 16 fathoms. This bay is a favorite anchorage for small craft because of its protection and good holding ground. The tidal current in the passage is always strong, sometimes reaching a velocity of 3 knots. Anchorage is prohibited in the southwestern part of the passage.

Off-lying Rt Kok, the northeastern extremity of Ostrvo Ist, to northwestward for about $4\frac{1}{4}$ miles is a narrow string of islets and shoals. The outer shoals and islets, known respectively as Plićine Grebeni and Otočići Grebeni, lie in the middle of the southeastern end of Silbanski Kanal. The outermost shoals have a depth of 6 feet and extend $\frac{3}{4}$ mile northwestward of the outermost islet. Otočići Grebeni consist of three islets, 128 to 171 feet high, separated by narrow passages. The northwestern extremity of the northwesternmost islet is marked by a light. Midway between Rt Kok and the southeasternmost of Otočići Grebeni are Otočić Križica, 62 feet high, and Hrid Križica. Plićina Križica with a depth of 9 feet lies $\frac{3}{4}$ mile westward of Rt Kok.

11B-17 Ostrvo Škarda, about 2 miles long, is mostly covered with thick bush and rises at its southeastern end to a height of 335 feet. A clear deep water passage about 750 yards wide lies between this island and Ostrvo Ist to eastward. Rt Suha, the western point of Ostrvo Škarda, is fronted westward by a shoal about 400 yards wide. A detached 22-foot patch lies $\frac{1}{2}$ mile southwestward of Rt Suha and a 26-foot patch lies 400 yards south-southeastward of Rt Šatrin, the southern point.

11B-18 Ostrvo Premuda lies with its southeastern extremity, Rt Lopata ($44^{\circ}18' N.$, $14^{\circ}40' E.$), 1 mile northwestward of Ostrvo Škarda. The island is $4\frac{3}{4}$ miles long and $\frac{3}{4}$ mile wide. The slopes of its hills, the

highest being 295 feet, are mostly covered with thick bushes. The island presents no landmarks at a distance but from close to the church in the village of Premuda on the northeastern side and the white chapel at Luka Krijal on the northwestern side are conspicuous. Fronting the northwestern shore at a distance of about 350 yards and paralleling it for about 1 mile is a narrow reef on which rise several bare rocks from 8 to 28 feet high. The seaward side of this reef as are the southwestern and northeastern sides of the island are steep-to. The reef is connected near its middle to the island by a shoal over which is a narrow channel with a depth of 16 feet. Luka Krijal, consisting of two curved quayed breakwaters for berthing small craft, lies in the northeastern side of the channel. A light is shown from the head of the northwestern breakwater. Uvala Loza, one of several coves on the northeastern shore, is situated below the village of Premuda about $\frac{3}{4}$ mile south-southeastward of the northeastern extremity of the island. A boat harbor is located on the southern side of the cove and a light is shown from the shore on the northern side.

The passage between Ostrvi Premuda and Skarda is narrowed to a width of 0.6 mile by shoals fronting Rt Lopata and Rt Suha. Two detached patches of $5\frac{1}{2}$ fathoms lie in the passage. A midchannel course should be steered with allowance made for the tidal current which is strong at times. The northwestern end of Otočić Grebeni and the chapel in Luka Sveti Ante at Ostrvo Silba in range, bearing 018° – 198° , leads through the passage in a depth of $6\frac{1}{2}$ fathoms. The dwelling on the southeastern entrance point of Luka Sveti Ante should not be mistaken for the chapel.

Otočić Kamenjak ($44^{\circ}21' N.$, $14^{\circ}35' E.$), 75 feet high, lies close northwestward of Rt Zubić, the northwestern extremity of Ostrvo Premuda, and with Rt Medvjak, the northeastern point, forms Uvala Nozdre, a deep water bay 700 yards wide. A shoal extends 300 yards northwestward from the latter point. A light is shown from the northern point of Otočić Kamenjak.

Otočić Lutrošnjak, a circular islet 62 feet high, lies about 800 yards north-northwest-

ward of Otočić Kamenjak. This islet is bordered by a reef which to southwestward extends 600 yards.

11B-19 Southeastern end of Ostrvo Lošinj, $7\frac{1}{2}$ miles north-northwestward of Ostrvo Premuda, is fronted southward and eastward by five islets. The largest and southernmost islet, Otočić Ilovik (Tovarnjak), is 2 miles long and 298 feet high. Rt Radovan ($44^{\circ}26' N.$, $14^{\circ}35' E.$), a low, slender, whitish point, forms its southeastern extremity. Close northward and separated from it by Luka Ilovik, lies Otočić Sveti Petar, a smaller, bold, wooded islet, 206 feet high. A light is shown on the southwestern side of the islet. A mooring buoy lies off the village. Otočić Kozjak, 128 feet high, lies close northward of the latter and, between it and Ostrvo Losinj, is a narrow deep water passage. Anchorage is prohibited in this passage. Otočići Orjul lie close together $\frac{1}{2}$ mile eastward of the southeastern end of Ostrvo Losinj, the larger one, 180 feet high, to northwestward, and the smaller, 36 feet high, to southeastward. The light-colored slopes of these islets are prominent. A submarine cable is laid in a north-northwesterly direction between the northern end of Otočić Ilovik and the southeastern shore of Ostrvo Losinj. Another submarine cable is laid in a north-northwesterly direction between the northwestern end of Otočić Sveti Petar and the southeastern shore of Ostrvo Losinj. A submarine cable is laid in a southeasterly direction between the southeastern end of Otočić Ilovik and the northwestern side of Ostrvo Silba. Two submarine cables are laid in a south-southeasterly direction from a point on the southern control shore of Ostrvo Ilovik to northern shore of Ostrvo Premuda.

Luka Ilovik is the channel between Otočići Ilovik and Sveti Petar, and is 225 yards wide at its narrowest part. Shoals border the fairway where there is a least depth of 19 feet. Small craft may enter either end but the southeastern passage is wider and better. Small craft facilities are available on the northwestern shore of the channel in front of the village of Ilovik, and also on the southeastern shore where a light is shown.

Otočić Grujica ($44^{\circ}25' N.$, $14^{\circ}34' E.$), lies about midway between Otočići Ilovik and Lutrošnjak. This islet, 16 feet high, stands

on a narrow reef, over which there is a least depth of 22 feet, that extends nearly 1 mile northward. A light is shown from the southwestern side of the islet; a fog signal is sounded at the lighthouse.

A detached rocky patch with a depth of 31 feet lies $1\frac{1}{2}$ miles southeastward of Otočić Grujica.

Pličina Veli Brak with a least depth of 6 feet over a rocky head lies $2\frac{1}{2}$ miles eastward of Rt Radovan and is marked by a light.

The principal channel between the sea and Mali Kvarner lies between Otočići Grujica and Lutrošnjak. The channel between Otočići Novik and Grujica is not recommended for large vessels.

11B-20 Ostrvo Silba is a narrow, well cultivated saddleback island, $4\frac{1}{2}$ miles long, lying 3 miles northeastward of and paralleling Ostrvo Premuda. The highest hill rises to 262 feet at its northern end. Silbanski Kanal is the channel between Ostrvi Premuda and Silba, and it is the direct route from Zadarski Kanal and Sdrenji Kanal to the western coast of Istria and Porto di Trieste. Pličine Grebeni and Otočići Grebeni (sec. 11B-16) lie in the middle of the southeastern end of Silbanski Kanal. The channel is entered from southeastward between Otočići Grebeni and Rt Južni Arat ($44^{\circ}21' N.$, $14^{\circ}44' E.$), the southwestern extremity of Ostrvo Silba. Shoal water extends offshore about 350 yards from the cape. A light is shown from Rt Južni Arat.

Luka Sveti Ante is entered close northwestward of Rt Mavrova, about $\frac{3}{4}$ mile northwestward of Rt Južni Arat. The harbor consists of two coves, the northern one containing a jetty for small craft. A conspicuous chapel stands at the head of the northern cove below some ruins.

Sidrište Žalić is a bight about $1\frac{1}{4}$ miles long providing good anchorage for large vessels. The bight lies off the middle western part of the island before the village of Silba, which occupies the whole width of the low

part of the island. The best berth is in depths of 15 to 23 fathoms over fair holding sand at a distance of 600 to 800 yards offshore.

Luka Žalić, situated on the western shore at the village of Silba, consists of a mole alongside which small vessels may berth. The head of the mole is marked by a light. The remains of a breakwater extends southwestward from a position 100 yards northward of the mole and is marked near its outer end by a red buoy. This buoy should be left to port for a vessel berthing at the pier.

The eastern side of Ostrvo Silba is described with Olipski Kanal (sec. 11B-21).

Directions for Silbanski Kanal.—A vessel approaching from southeastward should steer in midchannel between Otočići Grebeni and Rt Južni Arat on course about 312° , and when abeam to southwestward of the chapel at Luka Sveti Ante and clear of Pličine Grebeni, course may be altered to 292° , passing into the Adriatic about 1 mile north-northeastward of Otočić Lutrošnjak.

11B-21 Ostrvo Olib is 2 miles long and consists of two hilly parts joined by a low middle section. The northern summit is 111 feet high and the southern, 236 feet. The hill slopes are cultivated with olive trees. Rt. Tale ($44^{\circ}22' N.$, $14^{\circ}45' E.$), its western extremity, lies about 1 mile eastward of the southern part of Ostrvo Silba from which it is separated by Olipski Kanal. The island is widely bordered by islets, rocks, and shoals.

Two points form the southern side of the island, Rt Ploče, to eastward, and Rt Zubinin, nearly 1 mile westward. The former is fronted for a distance of $\frac{3}{4}$ mile offshore by Pličina Grišni Muli, a reef with a depth of 15 feet, and the latter point for a distance of $\frac{1}{2}$ mile offshore by Pličina Zubinin, with a depth of 8 feet. The southern extremity of Plicina Grisni Muli is marked by a spherical buoy, painted in red and black horizontal bands, with a white horizontal median band. The summit of Ostrvo Skrda in range with the northwestern end of Ostrvo Planik,

bearing 006°, leads clear eastward of these two reefs.

Luka Sveti Nikola on the southwestern shore midway between Rt Zubinin and Rt Tale is a small bay forking into two heads with a prominent chapel on the shore of the western head.

Anchorage is prohibited, because of submarine cables, about one mile north-northwestward of Luka Sveti Nikola.

Luka Olib, situated about 1½ miles east-northeastward of Rt Tale on the shore of a bay at the village of Olib, consists of a harbor for small craft and a quayed breakwater used by local steamers. The head of the breakwater is marked by a light.

Hrid Sip, a narrow rock 700 yards long and 16 feet high, lies close off and is almost connected to Rt Sip, the northwestern extremity of Ostrvo Olib. A reef borders Hrid Sip and Rt Sip for a distance of about 225 yards and extends southward for nearly 1¼ miles, near the southern extremity of which rises Hrid Kurjak, 13 feet high.

Otočić Morovnik, about 16 feet high and bare, lies about 1 mile northwestward of Rt Sip. It is bordered by a reef which to north-eastward extends about 700 yards. A light is shown from the northwestern side of the islet.

Pličina Morovnik (44°27' N., 14°43' E.), a detached reef with a least depth of 13 feet, lies 1¼ miles north-northwestward of Otočić Morovnik and on the range of that islet with Hrid Kurjak, bearing 149°-329°. The church in the village of Premuda bearing about 218° and open northwestward of Ostrvo Silba leads clear northwestward of the reef; the church in the village of Olib bearing about 145° and open well westward of the western side of Otočić Morovnik leads clear southwestward; and the southeastern side of Ostrvo Silba in range with the western side of Otočić Morovnik, bearing about 181°, leads clear eastward.

The eastern shore of Ostrvo Olib is described in section 11B-22.

The eastern shore of Ostrvo Silba is bordered by a shoal not exceeding 300 yards wide and is otherwise steep-to.

Luka Silba, situated on the eastern side of Ostrvo Silba at the village of the same name, consists of a curved breakwater with a high sea wall protecting a quay and several boat jetties. There is a depth of 8 feet at the quay which is used by local steamers. The head of the breakwater, which is marked by a light, should not be approached closer than 15 yards.

Directions for Olipski Kanal.—Vessels approaching from southward should steer a course of 342° from a position with Rt Arat, the southeastern point of Ostrvo Silba, bearing 252° distant 0.5 mile. This course leads clear of all dangers and passes all points at a distance of about ½ mile.

SOUTHEASTERN ISLANDS AND CHANNELS IN MALI KVARNER

11B-22 Channel between Ostrvo Olib and Ostrvo Maun, which is in reality the southern part of Mali Kvarner, is about 3½ miles wide at its narrowest part and is entered from southeastward between Rt Ploče (sec. 11B-21) and Rt Maun (44°24' N., 14°58' E.), the southern extremity of Ostrvo Maun, 7½ miles east-northeastward. During daylight in bad weather, Maunski Kanal is preferable to this channel.

On the western side of the channel between Rt Ploče and Rt Arat, 3½ miles northward, the eastern side of Ostrvo Olib is bordered by a reef with depths of less than 6 fathoms and about 900 yards wide in places. Hrid Fućin, 13 feet high, lies about ¾ mile north-northeastward of Rt Arat near the northwestern end of a reef, which is steep-to on its eastern side, and is joined westward to Ostrvo Olib by a reef 600 yards wide, on which there is a depth of about 20 feet.

Ostrvo Planik, joined to Otočić Planičić, about ½ mile off its southeastern end, by a reef with a depth of 9 to 29 feet and containing a sunken rock, lies on the southwestern side of midchannel with its south-

eastern end about 3 miles northeastward of Rt Ploče. Ostrvo Planik is 115 feet high; its northern part is bare and the remainder is covered with bushes. Otočić Planičić is 20 feet high and light-colored. This group should not be approached from northwestward or southeastward closer than 600 yards.

The northeastern side of the channel is formed by Ostrvo Maun, a narrow island 5 miles long with a summit 210 feet high. Its slopes are partially covered with grass and shrubs and its coast is steep-to and rocky.

Otočići Brušnjaci, two in number, lie $\frac{1}{2}$ mile and 1 mile, respectively, east-southeastward of Rt Maun. The western and smaller islet is 23 feet high and bare with a sunken rock close off its southeastern side. It is bordered for 400 yards with a shoal of less than 6 fathoms. The larger islet is 59 feet high, sparsely covered with grass and light in color. It is bordered eastward for 800 yards by a shallow reef.

Ostrvo Škrda, a rocky bare island, $1\frac{3}{4}$ miles long and 174 feet high, lies about 1 mile northwestward of the northwestern point of Ostrvo Maun. A shallow reef extends about 800 yards southeastward from its southern extremity. A light is shown on the northwestern part of the island.

Otočić Pohlib ($44^{\circ}24' N.$, $14^{\circ}54' E.$), a bare, steep-to islet, 26 feet high, lies midway between Ostrvo Planik and Ostrvo Maun. A light is shown from the summit of the islet.

11B-23 The southwestern shore of Ostrvo Pag from Rt Hrastova (sec. 11B-6) to Rt Zaglav ($44^{\circ}24' N.$, $15^{\circ}02' E.$), 4 miles northwestward, consists of two indentations. Luka Nova Povljana, the smaller one and $\frac{1}{2}$ mile wide, lies directly northeastward of Rt Hrastova; its northern entrance point is marked by a light. A chapel and a grove of trees are conspicuous on the eastern shore. A breakwater with quayed shores at its root is located in the northern part of the bay. Vessels with drafts up to 10 feet can go alongside. A pier of piled stones is located

in the eastern part of the bay near the chapel. There is an anchorage for a large vessel in about 8 fathoms over hard mud midway between the entrance points.

Luka Košljun, about 2 miles wide, is entered between Rt Sminka, $1\frac{3}{4}$ miles northward of Rt Hrastova, on its southeastern side, and Rt Košljun, $1\frac{1}{2}$ miles northwestward. The 6-fathom curve lies 500 yards offshore at its greatest distance. At the village of Košljun on the northwestern shore, there is a breakwater, 160 feet long, which provides protection for small craft. The root of the breakwater is marked by a light. Large vessels can anchor in Luka Košljun in depths desired, but the bottom being sand over rock does not hold well in bad weather.

Rt Zaglav, a bare point $1\frac{1}{4}$ miles west-northwestward of Rt Košljun, is the southeastern entrance point of Maunski Kanal and is marked by a light.

11B-24 Maunski Kanal is situated between Otočići Brušnjaci, Ostrvo Maun, and Ostrvo Škrda, on its southwestern side, and Ostrvo Pag, on its northeastern side. A strong current sets through the channel and it is frequently visited by violent bora gales.

Maunski Kanal is entered from southeastward between Rt Zaglav and Otočić Veliki Brušnjak, $1\frac{1}{2}$ miles westward. This entrance is contracted to a width of about 1 mile by the reefs extending eastward from the islet, described in section 11B-22, and by a sand spit extending $\frac{3}{4}$ mile north-northwestward from Rt Zaglav. Pličina Sveti Martin with a least depth of 12 feet is situated $1\frac{1}{2}$ miles north-northwestward of Rt Zaglav on the outer end of a sand shoal extending $\frac{1}{2}$ mile off the shore of Ostrvo Pag.

Otočić Paladinka, a bare jagged islet 25 feet high, lies about 3 miles north-northwestward of Rt Zaglav and $\frac{1}{4}$ mile offshore.

Luka Šimuni, an angular inlet about $\frac{3}{4}$ mile long, is entered northwestward of Rt Šimuni, $2\frac{1}{2}$ miles northwestward of Otočić

Paladinka. The northwestern entrance point and the northwestern shore of the inlet are foul for a short distance as is the cove eastward of Rt Šimuni. There is a depth of 16 fathoms in the entrance, which is 200 yards wide, shoaling to 23 feet near the head where the inlet is about 100 yards wide. The bottom is sand over rock. The chapel of Sveti Šimuni on the western side of the head of the inlet is prominent but more so is one at an elevation of 125 feet at Fabijanići, $\frac{3}{4}$ mile eastward of Rt Šimuni. A light is shown on Rt Šimuni.

Uvala Mandre, the narrow entrance to which is marked by white stone beacons, one on each side, lies $1\frac{3}{4}$ miles northwestward of Rt Šimuni. There is a small quay with a depth of about 10 feet alongside for small craft. A light is shown from the shore in a position $\frac{1}{2}$ mile northwestward of the entrance to Uvala Mandre.

Rt Mišnjak ($44^{\circ}30' N.$, $14^{\circ}54' E.$), the northeastern entrance point of Maunski Kanal, lies $1\frac{1}{2}$ miles north-northwestward of Uvala Mandre. Otočić Mišnjak, an islet 12 feet high, lies on a shoal that extends a little more than $\frac{1}{2}$ mile northwestward of the point.

The northeastern shore of Ostrvo Škrda, the northwestern entrance point of Maunski Kanal, and that of Ostrvo Maun are steep-to.

Directions for Maunski Kanal.—A vessel approaching from southeastward should bring the chapel at Fabijanići, $\frac{3}{4}$ miles eastward of Rt Šimuni, to bear about 333° which leads midway between the reefs fronting the southeastern entrance points. From a position on this bearing $\frac{3}{4}$ miles east-northeastward of the larger Otočići Brušnjaci, a mid-channel course of about 810° leads northwestward clear of all dangers.

NORTHEASTERN ISLANDS AND CHANNELS IN MALI KVARNER

11B-25 The northwestern shore of Os-

trvo Pag between Rt Mišnjak and Rt Lun, the northwestern extremity of that island, 14 miles northwestward, forms the eastern side of Mali Kvarner and is much indented. The northern 10 miles of this shore is the southwestern side of a tongue of land about 1 mile wide and from 300 to 450 feet high.

Uvala Slatina is entered between Rt Mišnjak and a point about $1\frac{1}{4}$ miles north-northeastward. A large vessel may anchor in about 7 fathoms over mud northeastward of Otočić Mišnjak and clear of the bay's bordering shoal which in the southern part is 650 yards wide.

Luka Novalja lies between Rt Vrtlić, $3\frac{1}{2}$ miles north-northwestward of Rt Mišnjak, and a point 1 mile farther north-northwestward. Rt Vrtlić is bordered closely by a shallow reef and depths of less than 6 fathoms extend northwestward for $\frac{1}{2}$ mile. A detached patch of 5 fathoms lies about 1 mile southwestward of Rt Vrtlić, and another with $4\frac{1}{2}$ fathoms, rock, lies 800 yards farther southward. The northern entrance point is bordered by shoals for 600 yards. Small vessels can berth at the head of a quayed mole, 165 feet long with a depth of 10 feet, at the village of Novalja located at the northeastern side of the bay. Vessels of moderate size can anchor in the entrance about 600 yards from the northeastern shore in 7 fathoms of water. A light is shown from the molehead. An iron post, surmounted by a ball, marks the western end of a submerged ruined pier. To avoid the shoals off the entrance points, a vessel approaching by night should keep in the center of the green sector of the light, bearing 097° , and by day keep the range of the two churches in the village slightly open to northward.

Between the northern entrance point of Luka Novalja and Uvala Tovarnele, $\frac{3}{4}$ mile southward of Rt Lun, a distance of $9\frac{1}{2}$ miles, the shore is indented and is steep-to a short distance offshore. Uvala Tovarnele, a small cove suitable for sheltering small craft, is marked on its southern point by a light.

Rt Lun ($44^{\circ}42' N.$, $14^{\circ}44' E.$), the northwestern extremity of Ostrvo Pag, is a slender point on which stands a chapel in ruins. The church in the village of Lun, $1\frac{1}{4}$ miles southeastward of the point, is conspicuous from all directions. Greben Tovarnele with a depth of 3 feet lies on a shoal with depths of less than 4 fathoms midway between Uvala Tovarnele and Rt Lun and about 650 yards offshore. The rock is marked by a pole beacon surmounted by a ball. A shoal area about 600 yards long with a least depth of 21 feet lies $\frac{1}{2}$ mile westward of Rt Lun.

Otočić Laganj and Otočić Dolfin are two islets closely bordered by rocks and smaller islets lying on a reef about 3 miles long in a northwest-southeast direction, with Otočić Dolfin, the southernmost islet, lying about 2 miles west-southwestward of Rt Lun. These islets are somewhat covered with grass and low bushes but are bare for the most part. Otočić Laganj, the northern islet, is 23 feet high and Otočić Dolfin is 75 feet high, on the summit of which a light is shown.

11B-26 Ostrvo Rab is one of the most important islands in the gulf of Quarnaro and lies on the eastern side of Mali Kvarner with Rt Kalifront, its western extremity, $6\frac{1}{4}$ miles north-northwestward of Rt Lun. The island is $11\frac{1}{2}$ miles long and consists of three mountainous ridges running northwestward and southeastward separated by two valleys, the northeasternmost ridge being the longest. Kamenjak Vrh (Tinjaruš), 1,338 feet high, bare, reddish, and bell-shaped is the most conspicuous summit and is situated at about the middle of the island close to the northeastern coast. The slopes of the hills are forested and the valleys are cultivated. With the exception of the steep northeastern coast the island has numerous indentations.

Rt Kalifront ($44^{\circ}48' N.$, $14^{\circ}39' E.$) is the southwestern point of a low wooded promontory, about $\frac{3}{4}$ mile wide, extending north-

westward from Ostrvo Rab. The promontory descends gradually to Mali Kvarner from a hill, 302 feet high, 2 miles east-southeastward. A light is shown on Rt Kalifront.

Between the northern side of Rt Kalifront and Rt Sorinj, $2\frac{3}{4}$ miles north-northeastward, a large indentation is divided into two inlets by a point of land, close off which and connected thereto by an impassable reef, lies Otočić Maman. The southwestern side of Kamporska Draga, the southwestern inlet, is steep-to except at the entrance where it is bordered by a narrow shoal. The eastern side is bordered by a reef 500 yards wide in some places. A valley runs southeastward from the head of the inlet which is shallow. There is a depth of 33 fathoms in the entrance, the inlet shoaling gradually to the bordering reef.

Supetaraka Draga, the northeastern inlet, is entered between Otočić Maman and the coast under the summit of Sorinj, 430 feet high, about $\frac{1}{2}$ mile north-northeastward. The outer southwestern side of the inlet is encumbered by islets and rocks for 500 yards offshore but the opposite side is steep-to. A valley runs southeastward from the head of this inlet which is shallow. There is a depth of 32 fathoms in the entrance, the inlet shoaling gradually towards its head.

An anchorage, having 11 to 15 fathoms, is located in the center of the cove, and affords protection from northwesterly winds.

Rt Sorinj, which is marked by a light, is the low point of an undulating hilly projection forming the northwestern extremity of Ostrvo Rab. Its northeastern side is bare and grayish. The northern side of the point is bordered by a shoal 300 yards wide. An isolated rocky patch with a depth of 23 feet of water lies 800 yards northwestward of Rt Sorinj.

The northeastern extremity of Ostrvo Rab is described in section 11C-6.

11B-27 Paški Kanal is the communicating channel between the northern part of Mali Kvarner and Velebitski Kanal and is used by vessels bound to Luka Rab or Luka Karlobag. The channel lies between Ostrvo Rab and Ostrvo Dolin, on its northeastern side, and the long narrow northwestern extremity of Ostrvo Pag with Otočić Dolfin and Laganj off-lying it on its southwestern side. It is entered from northwestward between Rt Kalifront (sec. 11B-26) and Otočić Laganj (sec. 11B-25) and leads into Velebitski Kanal at its southeastern end between Rt Glavina (sec. 11B-38), on its northern side, and Rt Koromačna (sec. 11B-12), on its southern side.

The channel is $2\frac{1}{4}$ miles wide at its narrowest part, has depths of 38 to 55 fathoms in the fairway, and is free of dangers.

On the southwestern side of the channel from Rt Lun to the head of Uvala Stara Novalja, $10\frac{1}{2}$ miles southeastward, the coast of Ostrvo Pag is straight and steep.

Uvala Stara Novalja is a deep water bay $2\frac{1}{4}$ miles long and about $\frac{3}{4}$ mile wide at its entrance, free of dangers except for its shallow head. It is entered between the coast just described and Rt Deda, $1\frac{3}{4}$ miles westward of Rt Koromačna. The village of Stara Novalja is situated about $\frac{1}{2}$ mile southward of Rt Deda off which is the best anchorage in depths of from 15 to 20 fathoms. There is a small harbor off the village which is protected by two moles; depths of 11 feet are available along the outside of the western mole.

The shore between Rt Deda and Rt Koromačna is steep-to except for a reef closely bordering Rt Deda.

On the northeastern side of the channel between Rt Kalifront and Rt Frkanj, 5 miles southeastward, the shore of Ostrvo Rab is indented with several coves where coasters load. Several of the points are bordered with shoals 400 yards wide. Uvala Sveti Krištofor is entered between Rt Sveti Krištofor on the eastern side, a point 108 feet high

on which a chapel stands, 3 miles southeastward of Rt Kalifront, and a point 650 yards northwestward which is marked by a light.

On the southeastern side of the channel, Ostrvo Dolin, a narrow nearly bare island $4\frac{1}{2}$ miles long and 384 feet high at its southern end, lies parallel to and at a distance of from 380 to 1,150 yards offshore. Barbatski Kanal lies between these two islands. The southwestern shore of Ostrvo Dolin is steep-to and clear of dangers. Between Rt Frkanj, on which stand some ruins, and Rt Dolin (Donji), the northern point of Ostrvo Dolin, about $\frac{1}{4}$ mile southeastward, lies the entrance to Draga Sveta Eufemije, Luka Rab, and the northern part of Barbatski Kanal. Rt Dolin is marked by a light.

Directions for Paški Kanal.—Paški Kanal being entirely free of off-lying dangers, excepting those at its northwestern entrance in the vicinity of Otočić Laganj and Otočić Dolfin described in section 11B-25, it is believed that no directions for navigating are necessary and that the eye will serve as the best guide.

Draga Sveta Eufemije is a cove about $1\frac{1}{4}$ miles long and $\frac{1}{4}$ mile wide lying northeastward of the peninsula of which Rt Frkanj is the southeastern extremity and is entered between that point and Rt Sveti Ante, 700 yards east-northeastward and marked by a light. The head of the cove is shallow and a reef extends 100 yards southwestward from Rt Sveti Ante; elsewhere in the cove there are depths of 8 to 15 fathoms. The campanile of the convent of Sevti Franjo stands near the northeastern shore about $\frac{1}{2}$ mile northwestward of Rt Sveti Ante and a prominent old convent is located at the head of the cove. A submarine cable from Ostrvo Pag is landed about 300 yards northwestward of Rt Sveti Ante where there is a cable house. Large vessels can anchor in the middle of the cove westward of the convent of Sveti Franjo in 8 or 9 fathoms over good holding mud. There is a mooring buoy in the cove.

For lights and dangers in the approach from Paški Kanal, see those for Luka Rab, following directly.

LUKA RAB

Position: 44°45' N., 14°46' E.

Depths:

Approach, 6 to 20 fathoms.

Southern part of outer harbor, 9 fathoms.

Entrance of inner harbor, 18 feet.

Quay, 10 to 12 feet.

11B-28 Luka Rab consists of Vanjska Luka, a small outer harbor also known as Padova Cove, and a breakwater protected rectangular quayed inner harbor on the northeastern side of the tongue of land forming Rt Sveti Ante and on which the town of Rab stands.

11B-29 Navigation.—Luka Rab is entered from Paški Kanal via either Mali Kvarner or Velebitski Kanal, for which directions see under appropriate heading.

11B-30 Depths.—The depths in the approach vary from 6 to 20 fathoms. The southern part of the outer harbor has a depth of 9 fathoms but this harbor shoals rapidly toward the head of the cove and toward the inner harbor. There is a depth of 18 feet in the entrance to the inner harbor and about 13 feet in the center, but at only one quay is there a depth of 10 to 12 feet; the remaining quays have alongside depths suitable for boats only.

11B-31 Landmarks.—The town of Rab is partially walled and stands prominently with a cliffy seaward shore on the tongue of land southwestward of the inner harbor. Four square campaniles rise from the southwestern side of the town, the tallest and southernmost is that of the cathedral and is visible from the southern entrance of Barbatski Kanal; the remaining three are of equal

height and are spaced equidistantly apart. The campanile of the convent of Sveti Franjo, previously mentioned, is conspicuous from southward as is also the lighthouse on Pličina Frkanj (Garofalin).

11B-32 Anchorage.—There is an anchorage northwestward of Otočić Tunera, in 8 to 9 fathoms.

Anchorage is prohibited, because of submarine cables, on a line between Rt Sveti Ante and Rt Lun (sec. 11B-25).

11B-33 Approaches.—Luka Rab and Draga Sveta Eufemije are entered between Rt Frkanj and Rt Dolin (sec. 11B-27). This passage, 1,600 yards wide, is encumbered by Pličina Frkanj (Garofalin), over which there is a depth of less than 2 feet, in a position 400 yards southeastward of Rt Frkanj. There is a depth of 13 fathoms in the fairway between Rt Frkanj and Pličina Frkanj. A reef about 200 yards long with a depth of 12 feet lies with its northwestern end about 400 yards southeastward of Pličina Frkanj, providing a passage about 350 yards wide with a depth of 6 to 8 fathoms to northwestward, and another passage between it and Rt Dolin to southeastward, 500 yards with a depth of 6 to 20 fathoms.

Lights are shown from Pličina Frkanj and from a position in the water 15 yards from Rt Frkanj.

11B-34 The outer harbor, Vanjska Luka, also known as Padova Cove, about 550 yards long, is entered between Rt Sveti Ante and Otočić Tunera, 300 yards southeastward. This harbor is protected from southeastward by a breakwater connecting the islet with Ostrvo Rab. There is a small opening in the breakwater for boats. The inner and greater part of this cove is shallow. A breakwater known as the New Mole extends 45 yards

south-southeastward from Rt Sveti Ante.

The northwestern point of Otočić Tunera and the head of the New Mole are each marked by a light.

The inner harbor consists of a rectangular quayed basin, 1,560 feet long and 460 feet wide, entered through a passage about 160 feet wide between the quay on the northeastern side of the town, about 220 yards northward of Rt Sveti Ante, and the head of a breakwater extending southwestward from the opposite side of the inner harbor. A triangular projection of the eastern quay extends about 155 feet into the harbor. The northern and eastern sides of this harbor are shallow. The head of the breakwater is marked by a light.

11B-35 Directions for entering.—By day any of the three passages between Rt Frkanj and Rt Dolin may be used, keeping in the fairway in each passage, but in general the northwestern passage between Rt Frkanj and Pličina Frkanj (Garofalin) is preferred. By day this passage can be negotiated by steering on the range of the southern part of the town with the summit of Kamenjak Vrh, about $1\frac{1}{2}$ miles northeastward, bearing about 045° , and by night steering for the light at Rt Sveti Ante bearing 057° . The passage between Pličina Frkanj and the reef southwestward can be navigated safely by steering for the light on Otočić Tunera bearing 044° .

11B-36 Rab, with a population about 6,000, is the principal town of Ostrvo Rab. It has the most developed harbor and is the main commercial center of the island which is one of the most important in the Gulf of Quarnaro. The products of trade include wheat, wine, olives, silk, and marble. A salt works is located at the head of Draga Sveta Eufemije.

The southern part of the western quay fronting the town has an alongside depth of about 12 feet for a distance of 607 feet. The berth directly northward has an alongside depth of about 7 feet for a distance of 466 feet. The remaining quays have shallow depths suitable for boats only.

Fresh provisions are available. Water can be obtained, but there is often a shortage in summer.

Coastwise steamers call regularly.

NORTHEASTERN ISLANDS AND CHANNELS IN MALI KVARNER— (Continued)

11B-37 Barbatski Kanal (sec. 11B-27) is entered from northwestward between Rt Dolin, on its southwestern side, and a point on Ostrvo Rab, about $\frac{1}{2}$ mile northeastward, on its northeastern side. The channel is $4\frac{1}{2}$ miles long, varies in width from 380 to 1,150 yards, and has depths in the fairway from $6\frac{1}{2}$ to 19 fathoms.

The channel is entered from southeastward between Gornji Rt, the southeastern extremity of Ostrvo Dolin, on the southern side and Greben Poklib (Puschiva) (Hrid Pohlib), a bare, dark-colored rock, about $\frac{3}{4}$ mile northward on the northern side. Gregeni Skoljici (Cantarara), bare, dark-colored rocks, lie on a reef extending 500 yards southeastward from Gornji Rt. Greben Poklib lies 400 yards offshore of the southern extremity of Ostrvo Rab to which it is connected by an impassable reef. A light is shown on this rock. The northeastern shore of the channel is bordered by shoal water and reefs 400 yards wide in some places. The southwestern shore is bordered closely by shallow water.

Medium size vessels will find excellent sheltered anchorage over good holding mud and sand anywhere in the channel midway between the two shores. A berth 600 yards in diameter in about 9 fathoms over mud is situated a little over $\frac{1}{2}$ mile eastward of Rt Dolin with its center 500 yards off the shore of Ostrvo Dolin.

Directions for Barbatski Kanal.—Vessels approaching this channel from southeastward should not close Gornji Rt to southeastward nearer than $\frac{1}{2}$ mile and should avoid Pličina Glavina (sec. 11B-38) off Rt Glavina by keeping southeastward of the range of the church at Jablanac with Gornji Rt, bearing 062° – 242° , until within 1 mile of Ostrvo Dolin, thence a course northwestward should be shaped to pass between Ostrvo Dolin and Greben Poklib, favoring the

latter and the shore of Ostrvo Rab until $\frac{1}{2}$ mile northwestward of the rock, from which position the shore of Ostrvo Dolin should be favored slightly through the remainder of the channel.

For vessels approaching Barbatski Kanal from northwestward, the directions for entering Luka Rab in section 11B-35 will apply.

11B-38 Rt Glavina ($44^{\circ}42' N.$, $14^{\circ}52' E.$).—About $\frac{1}{2}$ mile eastward of Greben Poklib, a small point projects south-southeastward from Ostrvo Rab close off which lies a sunken rock. Rt Glavina, about $\frac{3}{4}$ mile farther east-northeastward, forms the eastern entrance point of a cove at the entrance of which lies Otočić Mišnjak.

Pličina Glavina, about 600 yards long and with a least depth of 5 feet, rock, lies with its center, which is marked by a light, 600 yards southward of Rt Glavina. A light is shown on a rock $1\frac{1}{4}$ miles westward of Rt Glavina.

NORTHWESTERN ISLANDS AND CHANNELS IN MALI KVARNER

11B-39 Lošinjski Kanal extends from Otočići Orjul (sec. 11B-19) to the narrows at Osor, about $13\frac{1}{2}$ miles north-northwestward and is bordered westward by the eastern side of Ostrvo Lošinj and eastward by the southwestern side of Ostrvo Cres and the islets and reefs extending southeastward from the latter island. The width at the entrance between Otočić Veli Orjul and Otočić Palacol ($44^{\circ}33' N.$, $14^{\circ}37' E.$), northeastward, is about $2\frac{1}{2}$ miles; towards its northern end the sides of the channel converge until at Osor the channel is only 20 feet wide. The northern end of the channel is shallow. The bottom for about 9 miles northward from the southern entrance is mud, after which it is sand and shells with weed at the northwestern end.

Lošinjski Kanal is too much exposed to southeasterly winds for safe anchorage but

small vessels can find sheltered berths in the coves indenting the shores.

Since this channel is connected with Kvarner only by Osorski Vrata, which is very narrow, strong irregular currents arise in the northern part in consequence of the difference of the level. Current is also present in the southern part.

The eastern shore of Ostrvo Lošinj is indented, the southern part being mostly steep and the northern part cultivated and more sloping.

Luka Rovenska is a harbor for small craft open northwestward and protected north-eastward by a breakwater situated about $2\frac{3}{4}$ miles northwestward of the southern end of Ostrvo Lošinj. The village of Veli Lošinj with a prominent campanile and a tower is situated close southwestward of the harbor. The church of Sveti Ivan (San Giovanni) stands conspicuously on a hill, 768 feet high, $\frac{3}{4}$ mile south-southwestward of the harbor. This church serves excellently for bearings by vessels navigating between the dangers off Rt Križa. A light is shown from a small point westward of Luka Rovenska and eastward of Luka Veli Lošinj. The latter is a small cove quayed for securing small boats along the sides of its head, at the extreme southeastern end of which is a protected basin of shallow depth.

Luka Sveti Martin, $1\frac{1}{2}$ miles northwestward, is a cove with a small craft basin formed by a breakwater, the head of which is marked by a light. The village of Mali Lošinj and a wooded conical hill are prominent close westward.

Otočići Veli Orser and Mali Orser are two bare ragged islets, the southern and larger one, 177 feet high, lying $4\frac{1}{2}$ miles northwestward of Luka Sveti Martin and close to the shore to which it is connected by a shoal. The smaller islet lies $\frac{1}{2}$ mile farther northward and 400 yards offshore. A pier, 60 feet

long with a depth of 11 feet at its head, projects from the southern shore of a cove close southward of the larger islet.

Luka Nerezine, 4 miles northward of Otočić Mali Orser, has two breakwaters, each about 180 feet long with an entrance, 108 feet wide, facing northeastward. The quayed southeastern part of the harbor will accommodate small vessels. There is a depth of 11 feet at the entrance, and from 6 to 10 feet inside the breakwaters. A light is shown from the head of the southeastern breakwater. The church of Sveti Jakov, about $1\frac{1}{4}$ miles southward of the harbor, and that of Osor, $2\frac{1}{4}$ miles northward, are conspicuous from as far as the southern part of Lošinjski Kanal.

Between Nerezine and a point, $\frac{3}{4}$ mile northeastward, Lošinjski Kanal narrows for $1\frac{3}{4}$ miles northward to Osor in the form of an inlet, where a narrow channel leads into Osorski Zaliv, separating Ostrvo Lošinj and Ostrvo Cres (sec. 11D-14).

11B-40 Rt Križa.—The southeastern extremity of Ostrvo Cres, which is wooded and partly cultivated, consists of a rugged and deeply indented shoreline about $2\frac{3}{4}$ miles wide. Rt Križa, the central point, is low and is situated on the eastern side of Luka Jadrešnica, the principal inlet. Rt Sveti Damjan is the northeastern point of the extremity, and Rt Suha, which is marked by a light, is the southwestern point.

The headland of Rt Križa is fronted by shallow water and rocky heads extending, at some places, a little more than $\frac{1}{2}$ mile southeastward. An isolated 29-foot patch lies $\frac{3}{4}$ mile southeastward of Rt Križa.

Luka Jadrešnica, entered close westward of Rt Križa, is a narrow inlet about $1\frac{1}{4}$ miles long which provides anchorage in 6 fathoms for small vessels off the village of Bokinić, the southernmost of three on the northeastern shore. Near this village is a mole for

small craft; a light marks the head of the mole.

Dangers off-lying Rt Križa.—Two islets and a number of dangerous reefs lie south-eastward of Rt Križa for a distance of about $6\frac{1}{2}$ miles. The larger islet, Otočić Oruda, 48 feet high, bare with rocky whitish-colored, sides, lies $4\frac{1}{4}$ miles southeastward of Rt Križa. Otočić Palacol, 20 feet high, lies close south-eastward. Greben Palacol, the southeasternmost danger off Rt Križa, with a depth of about 2 feet, lies 1 mile eastward of Otočić Palacol. A light is shown on Greben Palacol. A poi beacon surmounted by a ball marks a sunken rock about 1 mile northwestward of Otočić Oruda. Greben Metlina, consisting of a number of dangerous sunken rocks, lies in an area about $\frac{3}{4}$ mile wide with its approximate center, which is marked by a pole beacon surmounted by two balls, $1\frac{1}{2}$ miles north-northwestward of Otočić Oruda. Plicina Kriz with a depth of 13 feet is situated 1 mile northwestward of the beacon on Greben Metlina.

All the above-mentioned islets and dangers lie upon shallow bordering reefs. Some deep water passages between these dangers exist but they should not be attempted without local knowledge. With the exception of a 21-foot patch northwestward of Pličina Kriz, all these dangers lie within the red sectors of Otočić Trstenik Light (sec. 11B-42) and Rt Suha Light.

Directions for clearing dangers off Rt Križa.—The church of Sveti Ivan, southwestward of Veli Lošinj on Ostrvo Lošinj (sec. 11B-39), bearing 199° , leads through the channel between Rt Križa and Pličina Kriz in a least depth of about 11 fathoms. The large house midway between the church and the tower in Veli Lošinj serves as the front range mark of this bearing. Similarly, the northern summit of Otočić Trstenik (sec. 11B-42), to northward, bearing 019° , leads through this channel, which also lies in the white sector of Otočić Trstenik Light.

Mariners are advised that the light on Ostrvo Susak (sec. 11D-1) may be seen over Ostrvo Lošinj on certain bearings.

11B-41 The southwestern side of Ostrvo Cres from Rt Suha to Osor, about 7 miles northwestward, rises in gently wooded slopes.

Luka Martinšćica, about 2 miles northwestward of Rt Suha, is an inlet terminating northward in two shallow coves. A reef extends about 300 yards southward from the western entrance point. Small vessels can anchor in the entrance in about 11 fathoms.

The shore between Luka Martinšćica and Osor is indented with three coves suitable only for small shallow draft vessels.

11B-42 The eastern side of Ostrvo Cres forms part of the western side of Mali Kvarner. From Rt Sveti Damjan, the southeastern extremity of the island, which is wooded and 69 feet high, the coast trends 10 miles north-northwestward to Rt Koromačna ($44^{\circ}47' N.$, $14^{\circ}28' E.$). The southern part of this stretch of coast is much indented but without an anchorage for a large vessel.

Between Rt Kolovrat, situated 1 mile northwestward of Rt Sveti Damjan, and a point, about 1 mile farther northwestward, there is a bay having a number of inlets separated each from the other by bare rocky points of land, above which rise densely wooded slopes. Rt Kolovrat and the central point in the bay are each fronted northeastward by reefs for a distance of 700 yards. Another reef lies 600 yards northeastward of the northwestern entrance point. Luka Kolovrat is located in the southeastern cove off which small vessels can anchor in about 9 fathoms.

Uvala Toverašćica, $2\frac{1}{2}$ miles north-northwestward of Rt Kolovrat, and Uvala Koromačna, directly westward of the point of the same name, each offer limited shelter at anchor for small vessels with local knowledge.

Otočić Trstenik, $\frac{3}{4}$ mile long and 33 feet high at its northern end, lies $2\frac{1}{2}$ miles north-eastward of Rt Sveti Damjan. It is surrounded closely by a shallow reef. Two small bays on its northeastern shore provide a boat refuge. A light is shown from near the center of the islet.

Otočić Čutin, a bare whitish islet, 33 feet high, lies $4\frac{3}{4}$ miles northwestward of Otočić Trstenik and 1 mile offshore. The islet is bordered by a shallow reef 400 yards wide in some places on which to eastward of the islet is an above-water rock. A reef with a depth of 21 feet lies 600 yards northwestward of the islet and another one with a least depth of 12 feet lies between $\frac{3}{4}$ and $1\frac{1}{4}$ miles south-southeastward.

11B-43 Directions for the southern part of Mali Kvarner.—Northbound vessels from Zadarski Kanal to Kanal Srednja Vrata, via Kanal Krušija, will find the following courses, determined from the best scale local charts, to lead well clear of all dangers:

From a position at the northwestern entrance of Zadarski Kanal, 1.5 miles southwestward of Ostrvo Vir Lighthouse, 326° for about 18.5 miles to a position 2.5 miles equidistant between the lighthouse on Otočić Dolfin and that on Otočić Trstenik, whence 341° for about 18 miles to the entrance of Kanal Krušija. The first of these two courses leads close eastward of Otočić Pohlib which is steep-to.

Northbound vessels from Prolaz Maknare:

To join the track described above, eastward of Otočić Pohlib, 348° for about 10 miles from a position given in the directions for that passage on the range of the northwestern extremities of Ostrvo Tun Veli and Ostrvo Žverinac, bearing 216° , at the intersection of a bearing of 140° on the lighthouse on Otočići Tri Sestrice.

Northbound vessels from Rivanjski Kanal:

To join the same track at the same position, 343° for about 12 miles from a position

with Obručar Vrh bearing 191° and the lighthouse on Otočići Tri Sestrice bearing 140°.

Northbound vessels from Otočić Grujica Passage:

To join the same track at the position 2.5 miles equidistant between the lighthouse on Otočić Dolfin and that on Otočić Trstenik, 018° for about 8 miles from a position $\frac{3}{4}$ mile east-southeastward of Otočić Grujica to a position 1 mile eastward of Greben Palacol, whence, 357° for about $8\frac{1}{2}$ miles.

Southbound vessels from Kanal Srednja Vrata to Zadarski Kanal should steer the reciprocal courses of those given for northbound vessels.

Southbound vessels from Prolaz Maknare:

From a position given in the directions for that passage on the range of the northwestern extremities of Ostrvo Tun Veli and Ostrvo Žverinac, bearing 216°, steer on the range astern of Otočić Tovarnjak and Otočić Bivošćak, 107°–287°, or with Rt Radman Lighthouse ahead, bearing 106°, until clear northward and eastward of Pličina Sajda, whence, course may be shaped for the northwestern entrance to Zadarski Kanal.

Southbound vessels from Otočić Grujica Passage:

From a position about $\frac{3}{4}$ mile east-southeastward of Otočić Grujica, bring the lighthouse on that islet astern bearing 254° for about 9 miles until Otočić Pohib bears 123° or a little more, whence course may be shaped to pass either close eastward or close westward of that islet, from which position 146° leads to a position about 1.5 miles south-westward of Ostrvo Vir Lighthouse.

ANCHORAGES

- 11B-44 Sidrište Zaton.—Section 11B-6.
- Sidrište Privlaka.—Section 11B-6.
- Ninski Zaliv.—Section 11B-7.
- Uvala Dinjiška.—Section 11B-7.
- Luka Vinjerac.—Section 11B-8.
- Karlobag (Velebitski Kanal) (sec. 11B-

10).—Large vessels anchor off the quay in 29m (16 fm) to 40m (22 fm) over mud, with anchors to southwestward and hawser to shore northeastward.

Paški Zaliv.—Section 11B-11.

Luka Jazi.—Section 11B-15.

Ostrvo Premuda (sec. 11B-18).—Vessels of any size can anchor southwestward of the island for protection from the bora. The recommended anchorage for large vessels is in about 61m (33 fm) over sand about $1\frac{1}{2}$ miles off shore and about the same distance southward of Hrid Masarine, the largest islet off-lying Luka Krijal.

Sidrište Žalić.—Section 11B-20.

Luka Nova Poveljana.—Section 11B-23.

Luka Košljun.—Section 11B-23.

Uvala Slatina.—Section 11B-25.

Luka Novalja.—Section 11B-25.

Supetarska Draga.—Section 11B-26.

Uvala Stara Novalja.—Section 11B-27.

Draga Sveti Eufemije.—Section 11B-27.

Luka Rab.—Section 11B-32.

Barbatski Kanal.—Section 11B-37.

Luka Jadrešnica.—Section 11B-40.

Luka Martinšćica.—Section 11B-41.

PART C. RT ŠTOKIĆ TO RIJEČKA-SUŠAČKA LUKA, INCLUDING OFF-LYING ISLANDS AND CHANNELS

11C-1 Rt Štokić (44°43' N., 14°54' E.), the outer western entrance point of Luka Jablanac, is marked by a light, and forms with Rt Glavina (sec. 11B-38), 1 mile westward, the narrowest part of Velebitski Kanal.

GENERAL FEATURES

11C-2 Velebitski Kanal extends 34 miles north-northwestward from Rt Štokić to Tihi Kanal, a narrow passage communicating with the eastern part of Riječki Zaliv. As southward of Rt Štokić, the rocky mainland coast rises to mountainous summits about 3

miles inland, increasing in height southeastward from Riječka-Susačka Luka to their highest altitude inland at about Rt Štokić.

Kanal Srednja Vrata, lying between Ostrvi Krk and Cres, connects the northern part of Mali Kvarner to Riječki Zaliv.

Several passages between Ostrvi Krk and Rab provide communication between Mali Kvarner and Velebitski Kanal.

CURRENT AND WIND

11C-3 The conditions described in section 11-3 and 11B-4 prevail generally in the area included in this part of the chapter. Local variations of the common pattern will be described in the appropriate sections.

NORTHERN PART OF VELEBITSKI KANAL INCLUDING TIHI KANAL

11C-4 General description.—The northern part of Velebitski Kanal lies between the mainland, on its eastern and northeastern sides, and Ostrvo Rab and Ostrvo Krk, with Ostrvi Goli, Sveti Grgur, and Privić intervening, on its western side.

The channel varies in width from 1 mile, off Jablanac, to $4\frac{3}{4}$ miles, narrowing to barely 600 yards at the entrance to Tihi Kanal. With the exception of a detached 20.1m (11 fm) patch, the depths in the fairway are from 42m (23 fm) to 110m (60 fm) with no hidden dangers.

The eastern mainland shore of the channel from Jablanac to Luka Novi, $25\frac{1}{2}$ miles northward, is barren, rocky, and precipitous. Except for Luka Senj, the only shelter provided by this coast is that for small craft in the numerous coves. Between Luka Novi and Rt Ertak, the southern entrance point of Tihi Kanal, $9\frac{1}{2}$ miles northwestward, the slopes are gradual, mostly covered with trees and in parts cultivated.

The southwestern shore of the channel is formed by Ostrvo Rab, which is described in section 11B-26. With the exception of the northern part, the northeastern coast of this island is precipitous and steep-to.

Ostrvo Krk forms the northwestern shore of Velebitski Kanal and Tihi Kanal for about

20 miles. This coast is steep, rocky, and bare. During the hura it is enveloped in spray which materially reduces visibility.

Between the northern end of Ostrvo Rab and the southern end of Ostrvo Krk, a distance of 5 miles, lie two islands, Ostrvo Sveti Grgur to southward, and Ostrvo Privić to northward. A third island, Ostrvo Goli, lies southeastward of Ostrvo Sveti Grgur. Deep water channels connecting Velebitski Kanal and the northern part of Mali Kvarner exist between these islands.

Tihi Kanal, a narrow winding, but deep water channel about 8 miles long, connects the northern end of Velebitski Kanal and Riječki Zaliv.

A submarine cable (sec. 1-23) is laid from Rt Rebica (sec. 11C-8) westward to a point about $1\frac{1}{4}$ miles southeastward of Senj (sec. 11C-10).

11C-5 The eastern side of Velebitski Kanal between Jablanac (sec. 11B-13) and Luka Sveti Juraj, about $18\frac{1}{2}$ miles northward, is steep and rocky with several indentations where small vessels can anchor.

Anchorage is prohibited, because of a submarine cable, between Rt Glavina (sec. 11B-38) and a point close northward of Jablanac.

Uvala Stinica, 1 mile northward of Jablanac, has an anchorage for a small vessel in its northern part in 14.6m (8 fm) to 20.1m (11 fm) over sand. A mooring buoy is located in the center of the bay but it is undependable for large vessels.

Luka Starigrad ($44^{\circ}48' N.$, $14^{\circ}53' E.$), $5\frac{1}{2}$ miles northward of Jablanac, has a small pier used by local steamers. On the northern entrance point there are a prominent church and dwelling.

The southern entrance point of Uvala Klada, about 1 mile northward of Luka Starigrad, is marked by a prominent cross on a column. The village of Klada Donja, conspicuous from northward, is situated at the southeastern part of the cove and is fronted by an embankment.

Luka Lukovo is a bay open to northward about 500 yards wide at its entrance situated $2\frac{1}{2}$ miles northward of Uvala Klada and directly eastward of a point of land. A breakwater and a mole extend a short distance off the village on the eastern side of the bay. Small vessels can anchor about 200 yards off the village in a depth of about 5.5m (18 ft.). A light is shown on the eastern side of the bay.

Draga Dumboka, $2\frac{1}{2}$ miles northward of Luka Lukovo, is a cove about 150 yards wide at its entrance which provides, for small vessels, an anchorage protected from the bora and yugo. A ruin on the southern side identifies the entrance.

Uvala Mlin, about $\frac{1}{2}$ mile north-northeastward of Draga Dumboka, is open to northward and has a small harbor at its southern end formed by two breakwaters which have an entrance 33 yards wide between them.

There is a depth of 7.3m (24 ft.) in a small area within the breakwaters. A reef with a depth of 1.8m (6 ft.) lies $\frac{1}{4}$ mile northward of the western entrance point of the cove and is marked on its northern side by a stone beacon, painted in red and black horizontal bands, and surmounted by a ball. A rocky patch with 12.8m (42 ft.) over it lies about $\frac{1}{4}$ of a mile northward of the stone beacon.

Between Uvala Mlin and Luka Sveti Juraj, $1\frac{1}{2}$ miles northward, the mouth of a small stream, which is obstructed by rocks and is always dry in summer, is crossed by a wooden bridge.

Luka Sveti Juraj ($44^{\circ}56' N.$, $14^{\circ}55' E.$) consists of a quayed basin about 80 yards wide partially protected northward by an I-shaped breakwater. There are two moles in shallow water, one northward of the basin, and one westward. **Otočić Zečjak** lies close off Rt Sveti Juraj, the western entrance point of the harbor but provides it no shelter. There is a depth of 3.9m (13 ft.) along the 127-foot length of the western side of the outer leg of the breakwater. Vessels of moderate size

can anchor between 200 and 500 yards north-northwestward of the head of the breakwater which is marked by a light. The town of Sveti Juraj, population about 4,000 lies eastward and southeastward of the harbor.

11C-6 The western side of Velebitski Kanal between Rt Glavina (sec. 11B-38) and Rt Krklant, $3\frac{3}{4}$ miles north-northwestward, on the northeastern shore of Ostrvo Rab, is bold and steep-to except for some off-lying dangers described below.

Uvala Mag, entered westward of Rt Mag, the northern extremity of a tongue of land, $\frac{1}{2}$ mile long, located $1\frac{1}{4}$ miles northward of Rt Glavina, is open to northward and is untenable as a berth during the bora. **Mag Grebeni**, the larger of the two being 26 feet high, lie close off the point of the same name.

Otočić Mag, 89 feet high but with its northern point low lying, is situated about $\frac{1}{2}$ mile north-northwestward of Rt Mag and $\frac{1}{4}$ mile offshore. The islet is bordered northward for 400 yards by a reef.

Rt Krklant, which is rugged, is fronted northward by a narrow reef. An isolated reef with a depth of 10m (33 ft.) lies about $\frac{3}{4}$ mile eastward of the point.

Between Rt Krklant and Uvala Crnka, about $5\frac{1}{2}$ miles northwestward, the shore of Ostrvo Rab continues bold and steep-to and is of a reddish color.

Lopar Peninsula, about 2 miles wide, extends about $1\frac{1}{2}$ miles northeastward from the northeastern side of Ostrvo Rab. The peninsula, which is 302 feet high at its center, is profusely indented and everywhere bordered by rocks and reefs, in some places for a distance of 600 yards. The neck of the peninsula is narrowed to northwestward by Uvala Lopar, entered $1\frac{1}{2}$ miles eastward of Rt Sorinj (sec. 11B-26), and to southeastward by Uvala Crnka.

The peninsula has four salient points of land; Rt Stojan to northward, Rt Šilo to northeastward, Rt Saramić to eastward, and

Rt Stolac to southeastward. The extremity of Rt Stojan, on which there is a hut and a beacon marking a cable landing, appears to be separated from the island. A shoal extending from the extremity of the cape has a rock which can be seen above low water only.

Anchorage is prohibited on a line between Rt Stojan and Rt Bracol (11C-8).

Plicina Vela Sika, with a depth of 0.6m (2 ft.), lies on the eastern side of Uvala Lopar, about 1/5 mile west-southwestward of Rt Stojan. Its western side is marked by a stone beacon. A bearing of 135° or less on the dome of the church of Sveta Marija on the eastern side of the head of Uvala Lopar clears to westward the dangers surrounding Plicina Vela Sika. A mole, marked by a light, is located on the western side of the peninsula about 1 mile southward of Rt Stojan.

11C-7 Ostrvo Sveti Grgur, a steep, bare island, 2¼ miles long and 760 feet high, lies northeastward of Lopar Peninsula from which it is separated by a deep water channel 700 yards wide at Rt Šilo on the peninsula. This passage is seldom used but if it should be, the side toward Ostrvo Sveti Grgur should be favored. The island is steep-to everywhere except in Luka Sveti Grgur on its northwestern side where there are shoals bordering the shores of the bay. Anchorage can be taken in the middle of the entrance of the bay in 20.1m (11 fm) to 35m (19 fm).

Ostrvo Goli lies on the western side of Velebitski Kanal, 1¾ miles westward of the mainland coast midway between Uvala Klada and Luka Lukovo, and 1¾ miles eastward of Rt Saramić. The island is bare, 1¾ miles wide and 755 feet high at its eastern side, from which elevation the land drops abruptly northward and eastward, and more gradually westward and southward. Greben Veli Brik, part of which uncovers, lies close off Rt Sajalo, the northwestern extremity. A light is shown from Rt Sajalo. Hridine Mali Goli, three low light-colored rocks, lie on a reef that extends 900 yards south-southeastward from Rt Blažna, the southern extremity.

The passage between Ostrvo Goli and Ostrvo Sveti Grgur, ¾ mile northwestward, is

free of dangers but is fully exposed to the bora.

A submarine cable extends from Rt Sajalo west-northwestward to Ostrvo Sveti Grgur.

A submarine cable extends eastward to the mainland from a point on the shore about 1/3 mile north-northeastward of Rt Blažna.

Ostrvo Prvic, a bare, mountainous island, 1,191 feet high, lies about 1¾ miles northeastward of Ostrvo Sveti Grgur, with Rt Stražica (44°56' N., 14°46' E.), its northwestern extremity, about ½ mile southeastward of Rt Škuljica, the eastern point of the southern end of Ostrvo Krk. Rt Šilo, its southeastern extremity, lies on the western side of Velebitski Kanal, 4¼ miles southwestward of Luka Sveti Juraj. The island, which is 4¼ miles long and 1¼ miles wide at its middle, is steep-to except for a shoal 300 yards wide fronting the western side between Rt Stražica and a prominent ruin, ¾ mile southward, and Hridine Njivice which are located on a reef extending 400 yards off the southwestern shore. A light is shown from Rt Stražica.

11C-8 Southeastern end of Ostrvo Krk.—The general description of Ostrvo Krk is given in section 11C-19. The southeastern end of Ostrvo Krk which is rocky and barren, is divided into two projections by Zaliv Baškanova. Rt Škuljica, the eastern point of the southern projection of the island, is low and is fronted close southeastward by two low dark-colored rocks. Between Rt Škuljica and Rt Bracol, 1¼ miles west-southwestward, there is a cable hut and beacon. Close eastward of the latter point is a cove used by small vessels unable to proceed through Senjska Vrata, see below, during the bora.

Zaliv Baškanova is entered between Rt Škuljica and Rt Rebica, 2½ miles northeastward. The shore of this bay which lies at the foot of a cultivated ravine is partly rock and partly sand over rock. The northwestern part of the bay is foul for a distance of 500 yards offshore.

Vessels can anchor in the bay in 20.1m (11 fm) to 29m (16 fm) over good holding about 450 yards southeastward of the breakwater at Luka Baskanova.

Luka Baškanova (Baška) ($44^{\circ}58' N.$, $14^{\circ}46' E.$), situated at the town of the same name at the northern part of Zaliv Baškanova, consists of a quay and two short moles protected to southeastward by a breakwater, 755 feet long. Off the northwestern side of the breakwater which is quayed there is a depth of about 7.9m (26 ft.) but it is shallow alongside. Small craft can secure to the inner side of the northwestern mole which is 246 feet long; there is a depth of 3.6m (12ft.) at its head, decreasing gradually to its root.

A light is shown on the breakwater head, another light is shown on the head of the western mole.

Uvala Velaluka is an inlet $\frac{1}{4}$ mile wide entered between a point about $\frac{1}{2}$ mile north-northeastward of Rt Rebica and Rt Sokol, the southeastern extremity of Ostrvo Krk, nearly $\frac{1}{2}$ mile farther east-northeastward. A cable hut and beacon is located on the shore of a cove northward of Rt Rebica. The inlet is exposed to the scirocco and is not recommended for an anchorage; the northern third is shallow. Tunny nets are set on both sides and at the head of the bay.

Senjska Vrata, the name of the passage between Ostrvo Prvić and Ostrvo Krk, is used by vessels bound to Luka Senj. A mid-channel course should be pursued to avoid the reefs closely bordering both shores. This passage is noted for the particular violence of the bora which is sometimes only local.

11C-9 The eastern side of Velebit-ski Kanal between Luka Sveti Juraj and Luka Senj, $3\frac{3}{4}$ miles north-northwestward, is steep, bare, and pierced by several ravines. Of the several coves, Uvala Spasovac, $1\frac{1}{4}$ miles south-southeastward of Senj, is the largest. Ruins stand on the southern entrance point and a cable office is located at the eastern side of the cove. The village of Planinkovac, $\frac{3}{4}$ mile south-southeastward, is conspicuous from a short distance.

LUKA SENJ

Position: $44^{\circ}59' N.$, $14^{\circ}54' E.$

Depths:

Entrance and middle of harbor, 12.8m (7 fm).

Quays, 1.8m (6 ft.) to 5.8m (19 ft.).

Port plan: Section 11C-17.

11C-10 **Luka Senj** is situated on Velebit-ski Kanal in a small bight in the mainland coast eastward of Rt Marija Art at the entrance of a deep ravine in the coastal range, $3\frac{3}{4}$ miles north-northwestward of Luka Sveti Juraj and $3\frac{1}{2}$ miles east-northeastward of Rt Sokol. Two breakwaters enclose a basin which has quayed sides and three moles. The town of Senj lies on the slopes of a ridge close southward of the harbor. A mountain torrent flows through the ravine and discharges directly southward of the harbor.

WIND

11C-11 At Luka Senj, the bora blows in squalls with great force enveloping the town in spray, during which time it is not safe to attempt entry. Should a vessel be berthed when a bora makes-up it is advisable to leave the harbor because rough seas and swells cause vessels to pound against the quays and moles, parting mooring lines and chains. Usually the stronger the bora blows, the shorter its duration. It often happens that while a strong bora is blowing at Senj, a calm or light breeze prevails at a distance of 5 or 6 miles southward or northward. The anchorage under Ostrvo Krk or in Supetarska Draga (sec. 11B-26) is preferable to exposure to bora gales at Luka Senj.

It is also inadvisable to attempt entrance during a strong sirocco.

Indications of an approaching bora consist of thick white horizontal clouds gathering around the summit of Pleševica (Velebit), 5,423 feet high located $10\frac{1}{2}$ miles south-southeastward, from which smaller masses are blown southwestward. The sky above Senj is usually clear. The wind is most often from the north until it reaches the harbor when it changes to east-northeast.

DEPTHS

11C-12 The depth in the entrance and in the middle of the harbor is about 12.8m (7 fm), decreasing southward and eastward. There are depths of 1.8m (6 ft.) to 5.8m (19 ft.) alongside the quays and moles.

LANDMARKS

11C-13 Besides the ravine opening eastward from the harbor, the best landmark is the ruins of a castle at Nehoj, standing on a ridge 279 feet high, situated about $\frac{1}{4}$ mile southeastward of the harbor.

11C-14 Anchorage.—The bottom of the harbor has poor holding quality. In a bora, large vessels can anchor off the harbor, westward of the shore between the southern breakwater and a church about 165 yards southward of its root, keeping well clear of the groin located northward of the torrent's mouth. During a strong bora it is advisable to leave the anchorage and seek shelter under the southwestern side of Ostrvo Krk.

Anchorage is prohibited southward of the port because of submarine cables. See section 11C-4.

HARBOR

11C-15 The harbor is entered between Lukobran Marija Art, a breakwater extending about 295 feet northward from Rt Marija Art, on the southern side and Lukobran Sveti Ambroža, another breakwater extending about 344 feet southwestward from the northeastern side of the harbor, on the northern side, providing an entrance about 245 yards wide. The harbor is quayed between the breakwaters. There are three moles in the harbor, Gat Sveti Nikole in the southeastern part, Novigat in the northeastern, and Drveni Gat midway between the latter and Lukobran Sveti Ambroža.

There are several mooring buoys in the harbor.

It is not unusual during winter boras for the quayside and bollards to be covered with frozen spray.

The heads of Lukobran Marija Art and Lukobran Sveti Ambroža are marked by lights. All the navigation lights may be extinguished temporarily during severe boras.

DIRECTIONS

11C-16 The approach and entrance to Luka Senj are free of dangers and no directions are considered necessary under normal weather conditions.

During severe boras and sciroccos the following recommendations developed locally may be of assistance to mariners.

From northward during a bora proceed along the coast, which is steep-to for 3 miles northward of Luka Senj, as close as is prudent until just northward of the entrance, thence head a little to seaward until the entrance is abeam, whence bring the vessel smartly into the wind heading for the berths in the northeastern part of the harbor. In the event that the strength of the bora will not permit a vessel to bring its head into the wind off the entrance, proceed to the calmer area indicated by the state of the sea invariably existing off the church or bathing beach close southward of the torrent's mouth, where the vessel can be turned about and headed as from southward.

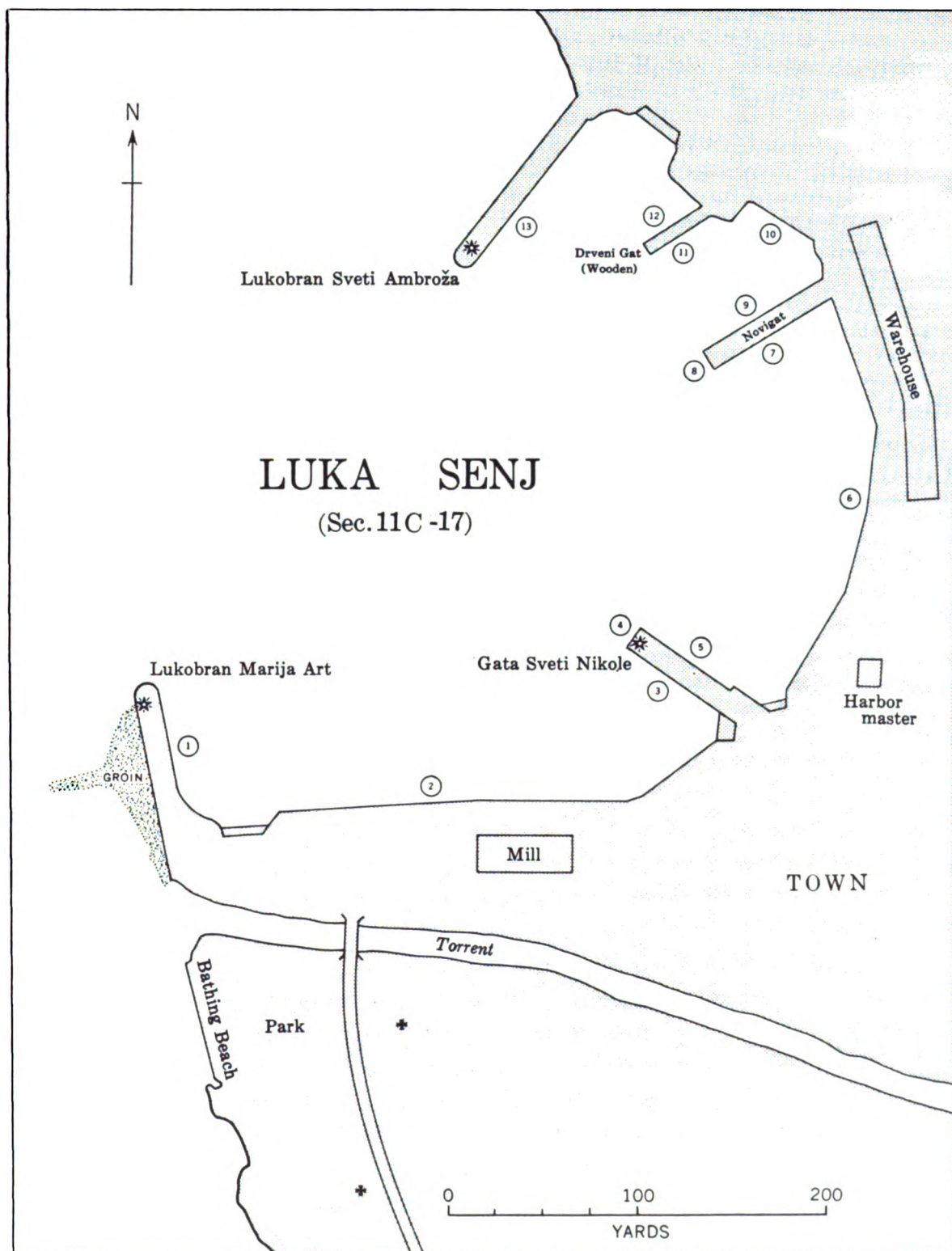
From southward during a severe bora, close the coast to a prudent distance off until close southward of Luka Senj, thence, after clearing the groin northward of the torrent's mouth, proceed into the wind toward the berths.

Vessels should give Lukobran Marija Art a berth of at least 110 yards because of rocks in its vicinity.

FACILITIES

11C-17 The town of Senj, which has a population of about 3,000, is built close southeastward of the harbor and stands partly on the slopes of Rt Marija Art. Lumber and tobacco are exported.

Berths.—Referring to port plan, the particulars of the berths, which are numbered for reference only, are as follows:



Berth	Length in feet	Depth in feet
1	155	11 to 18.
2	800	10.
3	180	13.
4	40	19.
5	235	16.
6	600	10.
7 and 9	200 each	10 to 13.
8	35	18.
11 and 12	125 each	8.
13	275	10 to 16.

The foundation of the breakwater at Berth No. 1 extends a distance underwater and the depths given are those available for breasted-off vessels. Berth No. 2 is not recommended. The water shoals towards the roots of both the breakwaters and the moles.

Supplies.—Provisions are available. Water is available from one hydrant on Gata Sveti Nikóle.

Communications.—The town is on the main coastal highway and is a regular port of call for coastwise vessels.

NORTHERN PART OF VELEBITSKI KANAL INCLUDING TIHI KANAL— (Continued)

11C-18 On the eastern side of Velebitski Kanal between Luka Senj and Luka Novi, $9\frac{1}{2}$ miles north-northwestward, the coast is barren and precipitous. Uvala Žrnovnica, $7\frac{1}{2}$ miles north-northwestward of Senj, and Luka Teplo, a short distance farther north-westward, afford sheltered anchorage for small vessels but the bora blows with great force in both places. The bluff point dividing these two coves has a reddish appearance.

Tunny nets are set in the entrance of a small bay about $\frac{3}{4}$ mile northwestward of Uvala Žrnovnica. Nets are also set in the vicinity of Luka Teplo and Uvala Žrnovnica.

Hrid Sveti Anton, about 11 feet high and bare, lies about $\frac{3}{4}$ mile southward of Uvala Žrnovnica and close to the coast to which it is connected by a shallow reef. A light is shown on the southwestern point of Hrid Sveti Anton.

Otočić Sveti Marin, 13 feet high, on which there is a conspicuous white church, lies $2\frac{1}{4}$ miles northwestward of Hrid Sveti Anton on a shallow reef that extends $\frac{1}{4}$ mile offshore.

Luka Novi ($45^{\circ}08' N.$, $14^{\circ}47' E.$), situated about $\frac{1}{2}$ mile northwestward of Otočić Sveti Marin, is small and will accommodate only vessels drawing less than 16 feet. The town

of Novi, population about 3,000, is situated prominently to northward on a hill overlooking the harbor. Potok Rečina, a stream, runs southeastward through a valley and discharges close northward of the harbor. A reservoir with a conspicuous tower is located about $\frac{1}{2}$ mile eastward of the town.

The harbor is protected to southwestward by a breakwater, 230 feet long, quayed on its northeastern side. A stone mole, 197 feet long, projects west-southwestward from the northern part of the harbor. The intervening shore is quayed. A groin, about 257 yards long, runs southwestward from the town and partially across the mouth of the stream.

The heads of the breakwaters and the mole are each marked by a light.

Depths.—There is a depth of 24 feet in the entrance, 18 feet between the breakwater and the mole decreasing to less than 6 feet in places alongside the quay between, and 12 feet along both sides of the outer part of the mole. The northern part of the harbor is shallow. The bottom is mud and sand, and holds well.

11C-19 Ostrvo Krk—General description.—Ostrvo Krk is the northernmost and largest of the islands in the Gulf of Quarnaro. The island is triangular in shape, 20 miles long and 11 miles wide at its broadest part. It has a population of about 20,000. To eastward it forms the western shore of Velebitski Kanal and to westward, the eastern shore of the channels connecting the northern part of Mali Kvarner with Riječki Zaliv.

Apart from the steep northeastern shores in Velebitski Kanal which are fully exposed to the bora, the island is well forested and cultivated with wide pastures almost everywhere. Wine, olives, and fruits are produced and a notable breed of horses is raised.

The southeastern part is more elevated, the highest mountain there being Obrova, 1,867 feet high. Brdo Sveti Juraj, 1,076 feet high, at about the middle of the island is the highest mountain to northward. The eastern coast is steep; on the northwestern side the slopes fall more gently to the sea. The south-

western part is lower and more fertile than the opposite side. The island is nearly everywhere surrounded by deep water with several bays. There are some partly sheltered anchorages but no harbors for large vessels.

11C-20 On the western side of Velebitski Kanal between Rt Sokol (sec. 11C-8) and Rt Šilo, 13 miles north-northwestward, the northeastern coast of Ostrvo Krk is precipitous and for the most part steep-to with a few close off-lying reefs and rocks. A light is shown from Rt Šilo, about 35 yards south-eastward of the spit.

Otočić Zečevo ($45^{\circ}00'N.$, $14^{\circ}50'E.$), steep to, except for a 5-foot patch off the western side, is 43 feet high and bare. It lies in the fairway of the channel about $1\frac{1}{2}$ miles north-northeastward of Rt Sokol and 1 mile off-shore.

Uvala Malaluka is an L-shaped cove entered $1\frac{3}{4}$ miles north-northwestward of Rt Sokol which provides good anchorage and shelter for small craft from all winds. The entrance is difficult to recognize.

Two rocks, one high and easily visible, lie close offshore about $\frac{1}{2}$ mile northwestward of the entrance to Uvala Malaluka. Another rock lies close offshore $2\frac{1}{2}$ miles farther northwestward.

Luka Sršćica, a cove providing an anchorage for small vessels, is entered from northward between Rt Glavina, 5 miles north-northwestward of Uvala Malaluka, and Rt Tenki, 1 mile westward. A low, bare rock lies close northward of Rt Glavina and one with a depth of about 3 feet lies a short distance off the western side of the entrance.

Luka Vrbnik, about $1\frac{3}{4}$ miles west-northwestward of Rt Tenki, is formed by a curved quayed breakwater extending northward leaving an entrance about 115 feet wide between it and the coast northwestward. Within the harbor there are a short mole and a basin. There is a depth of about 36 feet at the entrance and about 13 feet at the head of the mole. The town of Vrbnik, population about 3,000, is situated on the southeastern side of the harbor. A light is shown from the head of the breakwater.

A light is shown on Hrid Sv Anton, about 7 miles eastward of the light at Vrbnik.

Rt Sveti Marak, $1\frac{3}{4}$ miles northward of Luka Vrbnik, is a low short point on which stands a chapel.

The shore between Luka Vrbnik and Rt Šilo, $4\frac{3}{4}$ miles northward, contains several coves suitable as an anchorage for small craft in good weather. Rt Šilo, the extremity of a narrow tongue of land, is closely bordered by a shoal and, $\frac{1}{2}$ mile southeastward of it, a shoal with a depth of 14 feet extends 500 yards offshore.

11C-21 On the eastern side of Velebitski Kanal between Luka Nova and Rt Ertak, the southeastern entrance point of Tihi Kanal, $9\frac{1}{2}$ miles northwestward, the coast slopes gradually, is mostly covered with trees and in parts cultivated.

Rt Tokal ($45^{\circ}08'N.$, $14^{\circ}45'E.$), a steep, rocky point located about 2 miles west-northwestward of Luka Novi, is marked by a light.

The coast between Uvala Slana, nearly 1 mile northwestward of Rt Tokal, and Luka Crikvenica, 2 miles farther northwestward, contains several berthing facilities for small vessels.

Uvala Slana, about 165 yards wide, is protected from southward by a breakwater. At the head of the cove there is a mole about 155 feet long with an alongside depth of 10 feet. A small pier with a depth of 14 feet at its head is located between the mole and the breakwater. Mooring wires attached to seaward anchors are provided for berthing small vessels in a depth of about 14 feet. A small grove of tall trees above Rt Rtica, the southern entrance point, is conspicuous. The village of Slana consists of military and naval personnel only.

Luka Selce, situated close northward of the northern entrance point of Uvala Slana, consists of a bight protected from southwestward by a breakwater. A stone mole, 205 feet long, with an alongside depth of 6 to 12 feet, extends southwestward from the northeastern side of the bight. Vessels

berthing at the mole must use large fenders to avoid underwater projections. A depth of 6 fathoms exists between the heads of the breakwater and the mole. There are several jetties for fishing craft and a smaller breakwater enclosing a bathing beach. A light is shown from the head of the mole. A vessel approaching from southward should keep this light bearing greater than 045° to avoid the shoals off the southern point of the light. The light is obscured between the bearings of 000° and 045° . A mooring buoy is secured about 425 yards northwestward of the mole. Vessels of moderate size can anchor westward of the head of the mole in $6\frac{1}{2}$ fathoms over good holding sand.

Luka Crikvenica, situated $1\frac{3}{4}$ miles northwestward of Uvala Slana, is formed by a breakwater which extends 935 feet with two knuckles in a general southwesterly direction from its southern side to the edge of a shoal which borders the shore for about 800 yards on each side of Crikvenica. The northern side of the breakwater is quayed. A basin which is also quayed lies between the inner part of the breakwater and a mole 320 feet northward. There is a depth of about 13 feet in the fairway between the heads of the breakwater and the mole which decreases gradually to 8 feet close to the head of the harbor. Small vessels can berth alongside the outer part of the breakwater. Near the root are sunken rocks. A river discharges eastward of the harbor. A prominent church stands on its eastern bank and a conspicuous hotel is located at the root of the mole. The head of the breakwater is marked by a light.

The northwestern side of the fairway over the shoal to the harbor is marked by two red buoys, the passage lying between these buoys and the breakwater. The southwestern edge of the shoal, southeastward of the head of the breakwater, is marked by a black buoy.

The best anchorage for large vessels is

with the head of the breakwater bearing 078° , distant about 1,200 yards, in about 24 fathoms over good holding mud.

The town of Crikvenica, population about 5,500, has frequent coastal steamer service with ports in the vicinity.

Rt Kačjak, $2\frac{1}{2}$ miles northwestward of Luka Crikvenica, has prominent white, rocky slopes. A cove providing partial shelter for small craft lies close eastward of the point. Large vessels can anchor in a bora about 800 yards westward of the point in 18 fathoms.

Rt Ertak, 2 miles northwestward of Rt Kačjak and the southeastern entrance point of Tihi Kanal, consists of a small hook of land descending from a bare conical hill, 203 feet high. A light is shown from an iron tower, 20 feet high, attached to a small dwelling situated on Rt Ertak.

Draga Havlišće, a cove directly eastward of Rt Ertak, provides partially sheltered anchorage for small vessels in the middle of the cove in a depth of 8 fathoms.

11C-22 On the western side of Velebitski Kanal the shore of Ostrvo Krk from Rt Šilo to Brdo Velo Čelo, $3\frac{1}{4}$ miles northwestward, is high and indented with two large bays and several coves. Between Brdo Velo Čelo and Luka Peškera, $2\frac{1}{2}$ miles northwestward, the shore is a continuous steep-to cliff about 160 feet high. From Luka Peškera a tongue of land extends 1 mile southeastward to form Rt Turnac, the northwestern entrance point of Tihi Kanal.

Luka Stipanja ($45^{\circ}09' N.$, $14^{\circ}40' E.$), the entrance to which is about $\frac{3}{4}$ mile wide, and which is open northward, lies close westward of Rt Šilo. The small harbor is formed by a breakwater, with a depth of about 10 feet along its southern side, projecting eastward from the village of Šilo at the head of the bay. The head of the breakwater is marked

by a light. There is an anchorage near the eastern side of the bay in 28m (15 fm) to 31m (17 fm).

Zaliv Soline, a bay about $1\frac{1}{4}$ miles long and $\frac{3}{4}$ mile wide is entered, $1\frac{1}{2}$ miles west-northwestward of Rt Šilo, between Rt Glavati to southward and Rt Solinji, 350 yards northwestward. Greben Solinji, with a depth of less than 1.8m (6 ft.), lies near the outer end of a reef that extends about 435 yards eastward from Rt Solinji, leaving a channel about 110 yards wide close to Rt Glavati but with depths of 10.1m (5 $\frac{1}{2}$ fm) to 16.5m (9 fm). The depths in the bay are from 3m (10 ft.) to 5.8m (19 ft.). Excellent shelter is offered to vessels drawing not over about 12 feet; the bottom is good holding mud. At the village of Klimno, $\frac{3}{4}$ mile west-southwestward of Rt Glavati, there is a small mole having a depth of 1.8m (6 ft.) along its southern side and 3m (10 ft.) at its head. An islet and a reef lie in the northern part of the bay. Rt Glavati and the head of the mole at Klimno are each marked by a light.

The entrance to Zaliv Soline is flanked by low-lying land and it is not easily recognized. A dark bare rock lying about 750 yards west-southwestward of Rt Glavati and near the southern shore is the best landmark and guide for entering. A light is shown on the rock.

Luka Peškera, an inlet nearly 1 mile long, lies between the steep main shore of Ostrvo Krk and the tongue of land terminating at Rt Turnac, to northeastward. The inlet is open to the seas caused by the scirocco and both it and the bora are particularly violent here.

11C-23 Directions for northern part of Velebitski Kanal.—This part of Velebitski Kanal being entirely free of off-lying dangers, excepting Otočić Zečevo (sec. 11C-20), it is believed that no directions for navigating are necessary and that the eye will serve as the best guide. Vessels generally keep to the northeastern or weather side of the channel for whatever protection from the bora its higher shore provides.

11C-24 Tihi Kanal connects the northwestern end of Velebitski Kanal with Riječki Zaliv and is situated between the mainland, on its northeastern side, and the northern end of Ostrvo Krk, on its southwestern side. It extends 3 miles northwestward from Rt Ertak ($45^{\circ}13' N.$, $14^{\circ}37' E.$) (sec. 11C-21) to the northern end of Ostrvo Sveti Marko. The channel is deep, and between Ostrvo Sveti Marko and the mainland is winding and constricted to a width of but 400 yards.

Bora gales blow here with great force; the scirocco is also strong and with it the current may attain a velocity of 3 knots. See, also, section 11C-33 and 11C-34.

Tihi Kanal is entered from southward between Rt Turnac, the southeastern extremity of the peninsula projecting from Ostrvo Krk, previously mentioned, on its northwestern side, and a point of land about $\frac{1}{4}$ mile northward of Rt Ertak, on its southeastern side. From this entrance, the channel leads northwestward between the mainland, on its northeastern side, and Rt Vošćica, 1 mile northwestward of Rt Turnac, on its southwestern side. From the latter position, the channel continues northwestward for about 1 mile to the winding and narrowest part between Ostrvo Sveti Marko, on its western side, and Rt Dubno, on its eastern side, from thence, Riječki Zaliv is entered northward of Ostrvo Sveti Marko.

From Rt Dubno, the mainland coast trends $1\frac{1}{2}$ miles north-northwestward to Rt Oštro, the southern entrance point of Bakarski Zaliv (sec. 11C-36).

The channel between Ostrvo Krk and Ostrvo Sveti Marko is not recommended.

Ostrvo Sveti Marko is barren, light-colored, and steep. The ruins of a tower stand on its summit, 338 feet high, near its southeastern end. This island is the best landmark in the vicinity and can be seen from almost anywhere in Riječki Zaliv. The vil-

lage and church of Voz on the peninsula of Ostrvo Krk are also prominent.

Rt Ertak, Rt Turnac, Rt Vošćica, Rt Dubno, and the northeastern corner of Ostrvo Sveti Marko, are each marked by a light.

The light on Rt Vošćica can be partially seen over Rt Ertak by vessels approaching from southward.

A submarine cable is laid across Tiki Kanal, in a northeasterly direction, from Rt Voscica.

Regulations for Tihi Kanal.—Southbound vessels using this channel are customarily accorded the right of way. Northbound vessels between Rt Ertak and Rt Dubno reduce speed and indicate their maneuvers by whistle signal.

NORTHERN PART OF MALI KVARNER

11C-25 General description.—The northern part of Mali Kvarner lies between Ostrvo Cres, on its western side, and Ostrvo Krk and the northern end of Ostrvo Rab, on its eastern side. The northern end of Ostrvo Rab is described in sections 11B-26 and 11C-6.

Ostrvo Plavnik lies between Ostrvi Cres and Krk, dividing the northern part of Mali Kvarner into two channels, that to westward being known as Kanal Krusija. Kanal Srednja Vrata (Krčki Kanal) leads from the northern part of each of the two latter mentioned channels into Riječki Zaliv. All the channels with the exception of that between Ostrvi Krk and Plavnik are free of hidden dangers and have depths from about 50m (27 fm) to 108m (59 fm).

11C-26 Ostrvo Cres — General description.—Ostrvo Cres forms the boundary between the northern part of Kvarner and the northern part of Mali Kvarner. The island is 35 miles long and has a breadth of 7 miles at its broadest part. A mountain chain extends along its entire length. Vrh Sis, 2,093 feet high, situated about $6\frac{1}{2}$ miles

from the northern end, is the summit. The center of the island is lower and rises again to Vrh Helm, 1,585 feet high, standing about 12 miles southward of Vrh Sis and about $\frac{1}{2}$ mile inland from the western coast, whence the summits decrease in elevation towards the southern end to a height of about 197 feet. The shores of the island are steep with deep water lying close offshore almost everywhere.

The eastern shore of Ostrvo Cres, exposed to the bora, is bare and almost uninhabited. The western shore is indented and contains several harbors and safe anchorages. This side of the island is nearly all either cultivated with vines and olive trees or wooded; the northern part is studded with villages.

For the general description of Ostrvo Krk, see section 11C-19.

11C-27 On the western side of Mali Kvarner, the eastern shore of Ostrvo Cres between Rt Koromačna (sec. 11B-42) and Rt Tarej, 10 miles northward, has few indentations and is mostly steep-to at a short distance offshore. It is exposed to the bora, which, especially westward of Senjska Vrata (sec. 11C-8) often sets in suddenly and with very violent squalls. There is no suitable anchorage for large vessels along this coast.

Rt Tarej ($44^{\circ}57' N.$, $14^{\circ}29' E.$) is the eastern extremity of a rugged hill which is joined to Ostrvo Cres by a low, narrow isthmus, and which from a distance appears as a detached rock. The point is marked by a light.

11C-28 Southwestern side of Ostrvo Krk.—Between Rt Klobučac, $2\frac{1}{4}$ miles west-northwestward of Rt Bracol (sec. 11C-8) and Rt Negrit, about $3\frac{3}{4}$ miles farther northwestward, the coast is barren and steep. A narrow shoal with depths of less than 5.5m (3 fm) borders Rt Klobucac and Uvala Stara Baska, northward of it. A shoal with a depth of 4.9m (16 ft.) extends 300 yards

offshore a short distance southward of Rt Negrit, from which a light is shown.

Otočić Galun, a bare, grayish-colored islet, 33 feet high, is situated about $\frac{3}{4}$ mile southwestward of Rt Klobučac. The islet is bordered by shoals and a detached $4\frac{1}{2}$ -fathom patch lies about $\frac{1}{4}$ mile southeastward; a 23-foot patch lies about 400 yards northwestward of the northwestern extremity of the island. A bank, with a least depth of 46 feet, lies about $1\frac{1}{4}$ miles southwestward of Otočić Galun. The northeastern point of the islet is marked by a light.

Krčki Zaliv indents the southwestern side of Ostrvo Krk about $1\frac{1}{2}$ miles and is entered between Rt Negrit and Rt Crnika ($45^{\circ}01' N., 14^{\circ}34' E.$), $2\frac{3}{4}$ miles northwestward. The shores of the bay are closely bordered by shoals. A rock with a depth of 21 feet lies 400 yards off the northwestern shore.

Anchorage for vessels in 21 to 23 fathoms, with good holding ground may be had southeastward of the town of Krk. During the bora and scirocco vessels anchor along the eastern side of the gulf, in 22 to 26 fathoms.

Puntarska Draga (Uvala Košljun), an inlet about $1\frac{1}{2}$ miles long, is entered through Košljunski Kanal which is about 130 yards wide between shoals extending from either side and has a least depth of 8 feet in the fairway. Rt Pod Stražicu, the eastern entrance point of the channel, is situated about $1\frac{1}{4}$ miles northward of Rt Tranjevo. Luka Punat, situated on the eastern side of the inlet about $\frac{3}{4}$ mile northward of Rt Pod Stražicu, is formed by two moles and an intervening pier. Small craft can berth along the northern side of the pier where there are depths of 13 feet. Northward of the pier is a wharf with depths of 5 to 11 feet. A mooring buoy is secured off Rt Pod Stražicu. The town of Punat, population about 2,000, is situated eastward of the harbor.

Aids to navigation.—Rt Pod Stražicu and the head of the southern mole are each marked by a light.

The eastern side of the fairway of Koš-

ljunski Kanal is marked by lights, and the center of the channel is marked by two white stone beacons, the one with the black conical topmark is on the starboard side and the other with the red cylindrical topmark is on the port side.

Luka Krk, situated on the northwestern side of Krčki Zaliv about $\frac{3}{4}$ mile northeastward of Rt Crnika, consists of a harbor about 435 yards long protected to southward by a breakwater over which heavy seas from southeastward break. A mole extends about 135 feet from the northern part of the harbor toward the head of the breakwater leaving an entrance about 328 feet wide. There are depths of about 13 feet along the western side of this mole. Farther westward on the northern side there is another mole and two small stone piers. The heads of the breakwater and the eastern mole are each marked by a light.

The town of Krk, northward of the harbor, stands high and has a prominent cathedral. Its population is about 2,500. Luka Krk is the chief port of export for the island.

KANAL SREDNJA VRATA (KRČKI KANAL)

11C-29 Southern approaches. — Ostrvo Plavnik and a number of dangers lie at the northern end of Mali Kvarner in the southern approaches to Kanal Srednja Vrata between Ostrvi Krk and Cres.

Ostrvo Plavnik, about $3\frac{1}{4}$ miles long and 636 feet high, lies with Rt Vele Pin, its northwestern extremity, about $1\frac{1}{2}$ miles northward of Rt Tarej and $\frac{1}{2}$ mile off Ostrvo Cres from which it is separated by Kanal Krušija. It is partly wooded; its northern and northeastern shores are steep with cliffs and crevices of reddish rock. Its shores are bold except off Rt Tanka Punta at the southeastern end. A light is shown from a position near Rt Vele Pin.

Kanal Krušija is deep and clear of dangers. Its western side from Rt Tarej to Rt Kozmin, about 2 miles north-northwestward, is barren

and steep-to except for a short distance where it is bordered by a narrow shoal. This channel connects Mali Kvarner with Kanal Srednja Vrata, and though narrower than the one northeastward of Ostrvo Plavnik, it is much used by vessels because of its freedom from dangers. The normal coastal current which at times is very strong flows towards Riječki Zaliv.

There is a signal station on the heights on the western side of the channel about $\frac{3}{4}$ mile southward of Rt Kozmin.

Otocic Kormat, 26 feet high, extends from $\frac{3}{4}$ to $1\frac{1}{2}$ miles southeastward from Rt Tanka Punta, the southeastern extremity of Ostrvo Plavnik, and narrows at its middle to almost form two islets. A sunken rock lies close off the southeastern end of the islet. There is a passage between the islet and the island but it is not recommended.

Otočić Krnjacol, 98 feet high, lies 1 mile north-northwestward of Rt Tanka Punta and 400 yards off the northeastern side of Ostrvo Plavnik.

Three shoals encumber the passage between Ostrvo Plavnik and Ostrvo Krk. Their depths and positions in reference to Rt Tanka Punta are: 10 feet, nearly $1\frac{1}{4}$ miles eastward; 20 feet, nearly $1\frac{3}{4}$ miles east-northeastward; and 24 feet, $2\frac{1}{4}$ miles northeastward. These shoals may be avoided by keeping to a distance of about $\frac{3}{4}$ mile off Ostrvo Krk until Rt Tranjevo light structure bears 033° , distant $\frac{3}{4}$ mile, whence steer midway between Ostrvo Plavnik and the shore of Ostrvo Krk, northward, on course about 296° .

11C-30 Kanal Srednja Vrata is entered from southward between Rt Crnika, on its eastern side, and Rt Kozmin, $4\frac{1}{2}$ miles west-southwestward, on its western side, and from northward between Rt Pelova ($45^\circ 08' N.$, $14^\circ 29' E.$), on its eastern side, and Rt Grota, $4\frac{1}{2}$ miles west-northwestward, on its western side. The channel is 10 miles long, has a minimum width of $2\frac{1}{2}$ miles, a fairway depth of not less than 33 fathoms, and is free of dangers.

Two submarine cables are laid across Kanal Srednja Vrata, in a north-northeasterly direction from positions about $\frac{1}{2}$ mile westward and $\frac{1}{2}$ mile eastward, respectively, of Rt Kozmin.

On the western side of the channel between Rt Kozmin and Rt Grota, $10\frac{1}{4}$ miles north-northwestward, the steep-to eastern coast of Ostrvo Cres is high, wooded, and cliffy in parts. It is exposed to the bora and there are no anchorages along the whole extent, and a near approach is to be avoided. There are no off-lying dangers.

The coast of the northern end of Ostrvo Cres between Rt Grota and Rt Jablanac, $2\frac{3}{4}$ miles northwestward, borders the southern side of Riječki Zaliv and is of the same character as the eastern coast southward. Vrh Trbisanšćica, 981 feet high, lies $1\frac{1}{4}$ miles northwestward of Rt Grota.

11C-31 On the northeastern side of the channel between Rt Crnika and Rt Glavotok ($45^\circ 06' N.$, $14^\circ 26' E.$), $7\frac{1}{2}$ miles northwestward, the western coast of Ostrvo Krk contains several coves suitable for sheltering only small craft in a bora. Uvala Čavlena is entered between Rt Glavotok and Rt Pelova, a high, rounded and wooded point, about $2\frac{3}{4}$ miles northeastward. Large vessels can anchor in this bay under the coast of the headland of Rt Pelova, which is steep-to, at a distance of about 600 yards offshore in 22 to 25 fathoms over good holding sand and mud. Rt Glavotok is marked by a light.

The best landmarks in Kanal Srednja Vrata from northward are a monastery on Rt Glavotok, and a white chapel on the western coast close northwestward of Luka Beli, situated $2\frac{1}{4}$ miles south-southwestward of Rt Grota. From southward, Ostrvo Plavnik and the town of Krk are prominent. A light is shown from Rt Sveti Mikula, about 3 miles westward of Krk.

The head of the mole at Luka Beli and Rt Manganel, about 1 mile southward of Rt Glavotok, are each marked by a light.

EASTERN PART OF RIJEČKI ZALIV

11C-32 General description. — The general description of Riječki Zaliv and that of

the coastal features of the eastern part of it are given in this part of the chapter. The coastal features of the western part are described in section 11D-28.

Riječki Zaliv is bounded eastward by the northern coast of Ostrvo Krk, northward by the mainland coast of Yugoslavia, and westward by the eastern coast of Istria. Relatively high land encloses the gulf.

There are three principal channels of approach: Tihi Kanal (sec. 11C-24) at the eastern side; Kanal Srednja Vrata (Krčki Kanal) (sec. 11C-29) from southward; and Kanal Vela Vrata (Porozinski Kanal) (sec. 11D-27) from southwestward.

Regulations.—The following regulations apply to Riječki Zaliv. 1. In order to maintain sanitary conditions in the gulf, oil residues may be discharged into the sea before entering any of the above three entrance channels but not in the gulf. 2. Vessels shall not proceed at a speed greater than 10 knots within 3 miles of the coast.

11C-33 Current.—The constant coastal current enters Riječki Zaliv from Tihi Kanal, proceeds along the northern and western shores, whence it enters Kanal Vela Vrata. Its average velocity is 0.5 knot. During a strong and prolonged scirocco, the current in and leaving Tihi Kanal can increase to 3 knots. Similarly, during a strong bora the current in Kanal Vela Vrata can reach 4 knots velocity.

11C-34 Wind.—During spring and summer, moderate southeasterly and northerly winds prevail. The former is accompanied by rain squalls and lasts generally two or three days. The northerly wind brings good weather and is encountered at night or it sometimes begins about 2 hours before sunrise, ceasing at sunrise. During summer, south-southwesterly or west-northwesterly breezes are usual during daylight.

In autumn and winter, the bora is the most violent wind encountered, enduring often for two or three days. In the western part of the gulf it is more moderate than in the eastern part, where, in Tihi Kanal and the vicinity, it can achieve hurricane

force. The scirocco in winter is also strong and is accompanied by continuous rain. The libeccio is also encountered in severe force for a few hours, declining in velocity but continuing thereafter with mist and rain for long periods.

11C-35 Northwestern side of Ostrvo Krk—Luka Malinska is situated at the southeastern side of Sidrište Malinski, a bay entered between Rt Pelova (sec. 11C-30 and 11C-31) and Rt Čuf ($45^{\circ}09' N.$, $14^{\circ}31' E.$), $2\frac{1}{4}$ miles northeastward. The harbor, which lies westward of the village of Malinska, is about 210 yards long and is protected by a quayed mole to northward and a shorter one to southward. There are depths of 2.4m (8 ft.) to 3.6m (12 ft.) in the outer part but the head is shallow. Small craft can berth along the southern side and head of the northern mole. A conspicuous yellow villa with red roof stands on the southern entrance point of the harbor. A shoal extends about 60 yards northwestward from this point, and is marked near its outer edge by a pole beacon. The head of the northern mole is marked by a light.

Although the bay has depths as great as 55m (30 fm), large vessels of deep draft can anchor southwestward of the village in about 18.3m (10 fm) to 29m (16 fm) close inshore where there is only a narrow bordering shoal. During a bora, the anchorage close off the village is recommended and with a hawser laid ashore to a bollard northeastward.

Between Rt Čuf and Tenka Punta (Rt Tanki), $4\frac{3}{4}$ miles northward, the shore is wooded, in places cultivated, and contains several coves suitable for sheltering small craft.

A light is shown on a mole at the village of Njivice, about $1\frac{1}{4}$ miles northeastward of Rt Čuf. A light is shown on Tenka Punta.

Omišaljčki Zaliv is entered between Tenka Punta and Rt Kijac, $\frac{1}{2}$ mile northeastward. Tenka Punta is the extremity of a peninsula, $1\frac{1}{2}$ miles long and 160 feet high, projecting north-northwestward. The eastern side of this peninsula is bare, rugged and steep-to. Both entrance points are bordered northward for a distance of 300 yards by shallow

water as are the southeastern side and the head of the bay. Luka Omišalj, consisting of a rocky projection and a small mole situated at the eastern side of the head of the bay, provides berthing space for small craft in a depth of about 3.9m (13 ft.). A light is shown on the head of the mole.

The bay affords sheltered anchorage from all winds except northwest in 29m (16 fm) to 50m (27 fm) over tolerably holding mud and sand. There is space for a number of vessels of the largest size in the middle of the bay.

During stormy weather vessels usually favor the eastern side, laying a hawser ashore.

The coast from Rt Kijac trends 1 mile northeastward to the northern extremity of Ostrvo Krk, off which lies Ostrvo Sveti Marko at the northern entrance to Tihi Kanal, and which is described in section 11C-24.

11C-36 Northeastern side of Riječki Zaliv.—Bakarski Zaliv is a landlocked basin, 2½ miles long and about 650 yards wide, approached by a short channel which is entered between Rt Oštro (sec. 11C-24) and Rt Molmarić (45°17' N., 14°33' E.), 875 yards northwestward. The basin is surrounded by partially wooded rocky hills from 267 to 876 feet high. There are depths of 18.3m (10 fm) to 37m (20 fm) in the basin whose sides are steep-to, except at each head and for a narrow bordering shoal on the southwestern side. Luka Bakar, described in section 11C-39, is situated at the northwestern head of the basin, and Uvala Bakarac at its southeastern.

The entrance channel to Bakarski Zaliv, which is about ½ mile long and 350 yards wide at its narrowest part, has a minimum depth of 39m (21 fm) in its fairway. The land rises steeply on the northwestern shore of the channel, which is steep-to. An isolated reef with a depth of 9.1m (5 fm) lies 220 yards offshore, about 550 yards west-southwestward of Rt Molmarić. On the southeastern side of the channel, the land rises gently at Rt Oštro which is bordered by shallow water with depths of less than 9.1m (5 fm) for a width of about 225 yards. Between Rt Oštro and Rt Kavranic, about ½ mile north-northeastward, the southeastern side of the channel is divided into two bays by Rt Fortica, forming Luka Kraljevica to

southward. The land rises steeply at Rt Kavranic which is also steep-to.

Rt. Kavranic is marked by a light. A lighted white buoy is moored about 2/3 mile west-southwestward of Rt Molmaric. A light is shown from a point about 880 yards north-northwestward of Rt Oštro. A cylindrical light buoy, painted black, is moored about 310 yards west-northwestward of Rt Oštro. A light is shown on Rt Babno, about 1/4 mile west-northwestward of Rt Kavranic.

Tunny nets are set, between April and November, southeastward of the boat basin at Bakar and between Rt Kavranic and Bakarac.

Winds in Bakarski Zaliv.—The bora, which usually commences suddenly and as suddenly ceases after two or three days, blows with particular violence down the slopes at the southeastern part of the bay, producing turbulent seas and wind of hurricane force in that part of the bay from the entrance south-eastward. The wind funnels out the entrance rendering its navigation impossible at that time. In the bay northward of the entrance, the bora blows down the steep slopes and is deflected by the opposite shore, producing many series of whirlwinds but of lessened danger. The violence of the bora is not felt at Bakar.

The sirocco blows along the axis of the bay producing seas at Bakar whose quays are frequently inundated. Navigation of the entrance should not be attempted during a strong scirocco.

11C-37 Luka Kraljevica, about 800 yards long, is entered between Rt Oštro and Rt Fortica, 450 yards north-northeastward. Conspicuous from offshore of the harbor are: the lighthouse on Rt Oštro; a quadrangular castle, with cylindrical turrets at each corner, situated amid trees above Rt Fortica; and a rectangular sanitarium facing the harbor off which there is a short pier located close southeastward of the castle. Almost the entire shore of the harbor is quayed, amounting to about 1,000 feet of berthing space. On the northeastern side of the harbor, close westward of the harbormaster's office, there is a landing mole, about 100 feet square, with an alongside depth sufficient for a vessel drawing about 10 feet. Shallow

water prevails alongside all the quays but there is sufficient depth for a vessel of medium size about 60 feet off them. A small shipyard has a floating drydock with a capacity of about 1,500 tons. The town of Kraljevica, population about 2,000, is situated on the eastern side of the harbor.

The square mole is marked by two lights.

Anchorage.—Vessels can anchor in the middle of the harbor where there is a depth of about 20.1m (11fm) over mud, but since the berths are only about 135 yards in diameter, medium-sized vessels usually lay out two anchors and run hawsers astern. Vessels are prohibited from anchoring in the head of the harbor with the square mole bearing less than about 057°.

Uvala Bakarac, the cove forming the southeastern head of Bakarski Zaliv, has a small boat basin protected by an angular breakwater, about 124 feet long, which is marked by a light. Small craft can berth along the eastern side of the outer part of the breakwater where there is a depth of about 3.3m (11 ft.). A small village is situated eastward of the basin.

11C-38 Coast westward of Bakarski Zaliv.—Lučica Urinj is formed by a short angular mole projecting from the northeastern side of Rt Urinj, situated 1¼ miles west-northwestward of Rt Molmarić. Small craft can berth at the mole which is marked by a light.

Luka Martinščica, a bay 725 yards long about 275 yards wide, is located 2½ miles northwestward of Rt Urinj and about 1¼ miles southeastward of the mouth of Rijeka Rečina at Sušačka Luka. The southeastern entrance point is high and a red-sided quarry close southeastward is conspicuous. The northeastern side of the harbor is quayed from which projects a small mole to which small craft can secure. A small vessel can berth at the heads of three piers at a factory on the northwestern side close to the entrance. There are two mooring buoys in the harbor.

A breakwater marked by a light at its seaward end, extends from the southeastern entrance.

Luka Martinščica contains the quarantine hospitals for Riječka-Sušačka Luka, situated close northwestward and which is described in section 11D-31.

LUKA BAKAR

Position: 45°18'N., 14°32'E.

Depths:

Harbor, 10.1m (5 1/2 fm) to 33m (18fm).

Quays, 3.9m (13 ft.) to 7.9m (26 ft.)

Port plan: Section 11C-46.

11C-39—Luka Bakar, situated at the northwestern head of Bakarski Zaliv (sec. 11C-36), is a roomy harbor about ¼ mile wide, with quays on both sides. The town of Bakar, northwestward of the harbor, is compressed on a gentle slope at the foot of the surrounding hills.

WIND

11C-40 See wind in Bakarski Zaliv, section 11C-36.

DEPTHS

11C-41 The depths in the harbor, clear of the bordering shoal, are from 10.1m (5 1/2 fm) to 33m (18 fm). The alongside depths at the quays used by medium- and large-sized vessels are from about 3.9m (13 ft.) to 7.9m (26 ft.).

LANDMARKS

11C-42 The most prominent landmark is the houses of the town overlooked by a church standing on a hill, 563 feet high, situated northwestward of the town. Also prominent are the cement factory with chimney and surrounding buildings, located on the southwestern shore, about ½ mile southeastward of the town, and the ore unloading wharf and facilities on the northeastern shore, about 2/3 mile east-south-eastward of the town.

11C-43 Anchorage.—The best anchorage is located about 300 yards south-southwest-

ward of the harbor master's mole in 21.9m (12 fm) to 28m (15 fm) over mud. Vessels also secure bow and stern in the middle of the harbor between the quays, using hawsers to bollards. A mooring buoy is anchored about 175 yards northwestward, another is moored about 1/2 mile southeastward of the quay at the cement factory, and another is secured close off the northeastern shore about 1/2 mile southeastward of Obala Podbok. A light buoy is moored about 3/4 mile southeastward of the cement factory.

HARBOR

11C-44 The northern side of the harbor is almost completely quayed, that part westward of the harbor master's mole, which is small, being known as Obala Primorje and is used only by craft of shallow draft. The mole is marked by a light. Obala Podbok extends southeastward beginning at a position about 500 yards southeastward of the mole. There is a quay at the cement factory, previously mentioned, and Obala Goranin is located about 350 yards northwestward of the factory. There is a small boat basin protected by two short breakwaters situated on the western side of the head of the harbor.

In 1967 a 787-foot deep water wharf was completed near the head of Luka Bakar, with depths of 51 feet (15.5m) alongside. It is mainly used for the discharge of ore. The harbor can accommodate ships up to 100,000 tons, and will specialize in handling bulk goods. Tanker unloading facilities are located on the southwestern shore of Bakarski Zaliv, about 1 1/4 miles southeastward of Bakar.

PILOTAGE

11C-45 Pilotage is compulsory for all vessels over 500 gross tons. Pilots meet vessels about 1/2 mile southwestward of Susacka Luka breakwater. Pilots are available both day and night.

FACILITIES

11C-46 The town of Bakar, population about 2,100, has a small trade in agricultural products and lumber. Tunny fishing is active from April to November. In addition to a customhouse and court-house, there are a Merchant Marine Academy and a tourist hotel.

Berths.—See port plan. Berthing particulars as regards length and alongside depths are as follows: Obala Primorje, 1,100 feet long, depths of 0.4m (1 ft.) to 3.9m (13 ft.). Obala Podbok 1,470 feet long, depths of 1.8m (6 ft.) to 7.9m (26 ft.); cement factory, 260

feet long, depths of 4.9m (16 ft.) to 7.3m (24 ft.); and Obala Soranin, 260 feet long depths of 3.9m (13 ft.) to 6.1m (20 ft.). Only Obala Podbok has railway facilities. A new quay was under construction in 1956 on the northwestern shore of the harbor. It is about 980 feet long with about 11.9m (39 ft.) alongside.

Supplies.—Provisions are rationed by the government but it is reported that foreign vessels can obtain some types in limited quantities. Water is available at the quay of the cement factory and at Obala Primorje.

Repairs.—There is a shipyard and repair facilities for wooden craft.

Communications.—The town is connected to the main railway system between Ogulin and Sušak, and by bus service to adjacent towns. It is a port of call for local steamers.

ANCHORAGES

11C-47 Uvala Stinca.—Section 11C-5.

Luka Lukovo.—Section 11C-5.

Draga Dumboka.—Section 11C-5.

Luka Sveti Juraj.—Section 11C-5.

Luka Sveti Grgur.—Section 11C-7.

Zaliv Baškanova.—Section 11C-8.

Luka Senj.—Section 11C-14.

Uvala Žrnovnica.—Section 11C-18.

Luka Teplo.—Section 11C-8.

Uvala Malaluka.—Section 11C-20.

Luka Sršćica.—Section 11C-20.

Luka Selce.—Section 11C-21.

Luka Crikvenica.—Section 11C-21.

Rt Kačjak.—Section 11C-21.

Draga Haulišće.—Section 11C-21.

Luka Stipanja.—Section 11C-22.

Zaliv Soline.—Section 11C-22.

Krčki Zaliv.—Section 11C-28.

Uvala Čavlena.—Section 11C-31.

Sidrište Malinska.—Section 11C-35.

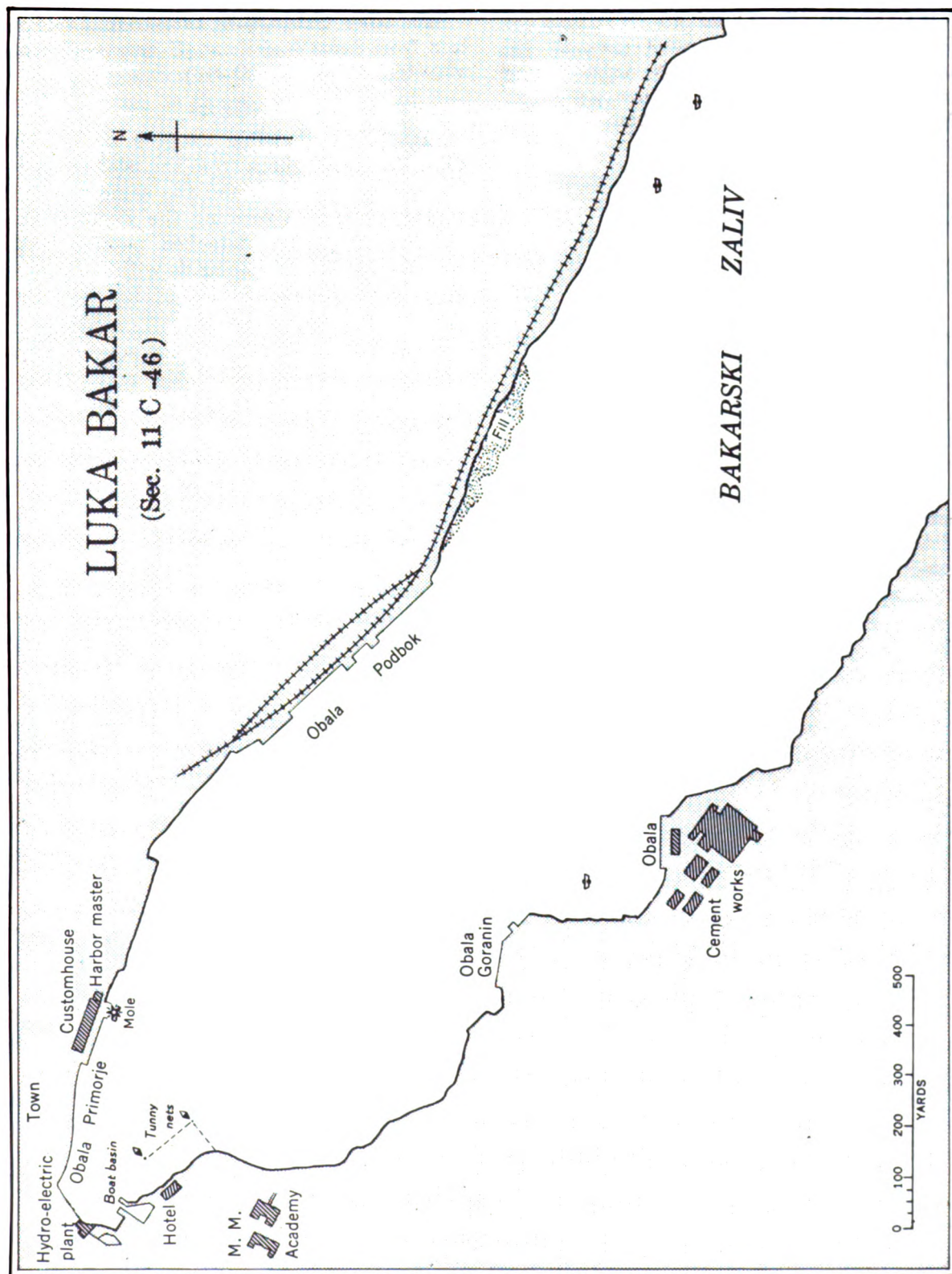
Omišaljski Zaliv.—Section 11C-35.

Luka Kraljevica.—Section 11C-37.

Luka Bakar.—Section 11C-43.

PART D. OSTRVO SUSAK TO RT MARLERA, INCLUDING KVARNER AND THE ISLANDS IN THE APPROACH THERETO, THE WESTERN PART OF RIJEČKI ZALIV, AND RIJEČKA-SUŠAČKA LUKA.

11D-1 Ostrvo Susak (44°31' N., 14°18' E.) lies in the southeastern approach to Kvarner, in a position about 10 miles west-northwestward of the southern end of Ostrvo Lošinj (sec. 11B-19). A light is shown from the summit of the island. For the description of Ostrvo Susak, see section 11D-6.



GENERAL FEATURES

11D-2 Kvarner is formed between the eastern coast of Istria, on its western side, and Ostrvi Cres, Lošinj, Unije, and Susak, on its eastern side. It communicates at its northern end, through Kanal Vela Vrata (Porozinski Kanal), with Riječki Zaliv.

On the western side of Kvarner between Rt Marlera and Rt Mašnjak, 21 miles north-northeastward, the eastern coast of Istria is generally rocky, precipitous, and of forbidding aspect. It is backed by extensive forests. The high lands of Istria, which are ramifications of the Julian Alps, are mostly on this side of the peninsula. There are no dangers at a distance of more than $\frac{1}{2}$ mile offshore. Among its indentations are a few narrow bays and inlets, but none is suitable for large vessels with the exception of Zaliv Raša. The bora is severely felt and scarcely a blade of grass grows on places fully exposed to it.

On the southeastern side of Kvarner, Ostrvo Lošinj forms $16\frac{1}{2}$ miles of the shore of Kvarner and lies close southwestward of Ostrvo Cres, described in section 11C-26. Ostrvo Lošinj is described in section 11D-10. Off-lying Ostrvo Lošinj to westward are the smaller Ostrvi Unije, Srakane, and Susak.

Kanal Vela Vrata connects Kvarner with Riječki Zaliv. Its western side is the coast of Istria between Rt Mašnjak and Rt Šip, 4 miles north-northeastward; its eastern side is the northern part of the western coast of Ostrvo Cres between Rt Prestenice and Rt Jablanac, the northern extremity of that island. The channel is deep and clear of dangers and has a least width of $2\frac{1}{4}$ miles. Both sides of the channel are partly bare and partly wooded. It is possible to anchor, in fine weather, almost anywhere over a bottom of mud and sand.

The general description of Riječki Zaliv is given in section 11C-32.

Submarine Cable.—A submarine cable is laid from Sveti Andrija (11D-26) southeastward to Cres (sec. 11D-16).

OFF-LYING DANGERS

11D-3 No invisible dangers lie farther than $\frac{1}{2}$ mile offshore from the islands forming the eastern side, and the same distance offshore of Istria forming the western side of Kvarner. Some detached patches with depths of $5\frac{3}{4}$ to 9 fathoms lie within a radius of 2 miles northwestward of Rt Segarina, the northwestern point of Ostrvo Susak.

Hrid Galiola, situated at the southern entrance to Kvarner about $4\frac{1}{2}$ miles northwestward of Ostrvo Unije, is bordered by a reef about $\frac{1}{4}$ mile wide.

Hrid Zaglav, closely bordered by a reef, lies $\frac{1}{2}$ mile offshore about 2 miles south-southwestward of Rt Pernat, the northern extremity of the western peninsula of Ostrvo Cres.

There are no off-lying dangers in Kanal Vela Vrata and in the western part of Riječki Zaliv.

NAVIGATION

11D-4 Caution.—Pilotage is compulsory in all Yugoslav ports for vessels over 500 gross tons. The navigation information given herein is totally independent of political restrictions or wartime dangers, and relates only to navigation safe from natural dangers.

The coastal track (sec. 11-2) continues northwestward toward Pličina Albanež (Secca Pericolosa) Lighthouse on course 318° from a position with Otočić Grujica Lighthouse bearing 048° , distant 8 miles. The closest this track approaches land between Otočić Grujica and Pličina Albanež is 3 miles southwestward of Ostrvo Susak.

For vessels from southeastward bound northward through Kvarner, the following

courses lead clear of all dangers to the southern entrance of Kanal Vela Vrata:

From a position on the coastal track with the lighthouse on the summit of Ostrvo Susak bearing 048°, distant 3 miles, course 350° for 8.7 miles, heading for Otočić Galiola until the lighthouse on Rt Vnetak, the southwestern point of Ostrvo Uniје, bears 080°, distant 1.5 miles; thence, course 003° for 30.5 miles to a midchannel position at the southern entrance to Kanal Vela Vrata between Rt Mašnjak, on Istria, and Rt Presenice, on Ostrvo Cres.

From the latter position, a course of 022° for 3.7 miles follows the fairway of Kanal Vela Vrata.

From a midchannel position at the northern entrance of Kanal Vela Vrata, a course of 032° for 10.8 miles leads to the entrance of Riječka-Sušacka Luka, and a course of 064° for 13.4 miles leads to the entrance of Bakarski Zaliv.

For vessels from westward and southwestward bound northward through Kvarner, the following courses lead clear of all dangers to the southern entrance of Kanal Vela Vrata:

From a position midway between Hrid Porer and Pličina Albanež Lighthouses, distant $\frac{3}{4}$ mile from each, course 068° for 5 miles, passing $\frac{1}{2}$ mile southward of Otočić Finera, off-lying Medulinski Zaliv, to a position with Rt Marlera Lighthouse bearing 357°, distant 1.6 miles; thence, course 034° for 14 miles until the point, about 2 miles northeastward of Crna Punta, is abeam to northwestward bearing 304°, distant 1 mile; thence, course 014° for 9 miles to a midchannel position at the southern entrance to Kanal Vela Vrata.

CURRENT AND WIND

11D-5 Current.—One part of the constant coastal current enters Kanal Vela Vrata in a southerly direction from the west-

ern part of Riječki Zaliv at an average velocity of 0.5 knot. Another part flows northward at an average velocity of about 0.4 knot close to the western shore of Ostrvo Cres, thence, in the vicinity of the southern entrance to Kanal Vela Vrata, it curves westward and southward, joining that part emanating from Riječki Zaliv, without change in velocity. During a strong or prolonged bora, the velocity of the current in Kanal Vela Vrata can reach 4 knots.

The flood tidal current is north-going along the coast of Ostrvo Cres and south-going along the coast of Istria; the ebb tidal current is south-going throughout Kvarner. In fine weather these currents are regular; at other times, the degree of irregularity depends on the force and the direction of the wind.

Wind.—The bora is often very violent and dangerous in Kvarner, and between Rt Kamenjak and Ostrvo Uniје, it produces whirling gusts and a heavy sea. When violent, the bora obliges vessels to head for shelter under Rt Kamenjak or for one of the harbors nearby; or, if necessary, to anchor at once wherever they may be. This wind undergoes remarkable shifts; northward, it usually follows the direction of the channel; towards the middle, it veers eastward; and it generally becomes northerly again as the coast of Ostrvo Cres is approached. In ports surrounded by high hills, the wind is often forced back from the leeward heights in the form of southwesterly squalls.

The scirocco, which blows with maximum frequency from October to April, occurs less frequently than does the bora. It produces a heavy sea and, in the cold season, causes heavy precipitation.

Southwesterly winds are mostly of short duration, but always cause a very high sea and frequently occur as squalls. In the north-

ern part of Kvarner, their direction becomes southerly.

ISLANDS ON THE EASTERN SIDE OF KVARNER

11D-6 Ostrvo Susak (sec. 11D-1)—General description.—Ostrvo Susak, about 2 miles long, is situated about 9 miles west-northwestward of the southern extremity of Ostrvo Lošinj. The island is flat for the most part but rises near the center to a summit of 321 feet on which stands the lighthouse. The shores are steep and bold except at the points which are closely bordered by shallow water. A $3\frac{1}{2}$ -fathom shoal lies about 400 yards southeastward, and a $6\frac{1}{2}$ -fathom rocky patch lies about 700 yards east-northeastward, respectively, of Rt Arat, the eastern point of the island. Some detached patches with depths of $5\frac{3}{4}$ to 9 fathoms lie within a radius of 2 miles northwestward of Rt Segarina, the northwestern point of the island.

A small breakwater protected harbor for small craft lies northeastward of the village of Susak in a cove on the eastern side of the island. Susak has a population of about 1,600. It is recognized by a conspicuous belfry located on a slope above the harbor. There are telegraph and telephone facilities and a Port Authorities Office. The summit of the island and the head of the breakwater at Luka Susak are each marked by a light.

Anchorage is prohibited in the southern part of the cove in which the above harbor is located.

An anchorage, partially sheltered from the bora, may be found under the lee of the island, south-southwestward of its summit, in 16 to 22 fathoms over sand. Vessels should avoid the rocky bottom close west-southwestward of Rt Segarina.

11D-7 Ostrvi Srakane consist of two narrow islands having an aggregate length of $2\frac{3}{4}$ miles, joined by a shoal with a depth of 3 fathoms. **Hrid Šilo**, which is marked by a light, lies about 400 yards off the southeastern end of the islands in a position 3 miles north-northeastward of Rt Arat on Ostrvo Susak. Ostrvo Srakane Vele, the

northern island, is 197 feet high, and Ostrvo Srakane Male is 177 feet high. The islands are partly wooded and are steep-to. The channel between these islands and Ostrvo Susak is free of dangers.

11D-8 Ostrvo Unije, about 5 miles long, is separated from Ostrvo Srakane Vele by a channel about $\frac{3}{4}$ mile wide with a depth of 12 fathoms in the fairway. **Plicina Arbit** with a least depth of 1 foot lies from 200 to 700 yards off Rt Arbit, the southeastern extremity of the island. The southeastern end of the reef is marked by a white pole beacon surmounted by a ball. The eastern side of the island is much indented. The island is hilly, with heights from 315 to 453 feet, the highest summit being toward the southern end. The village of Unije lies at the head of a cove on the western side of the island. The shores of Ostrvo Unije are fronted by rocks in places, but none lies farther offshore than 700 yards. There is a small boat harbor at Unije formed by a mole extending offshore southwestward and which is protected northward by a reef. Rt Vnetak, the southwestern point of the island, Rt Lakunji, the northern point of the island, and the head of the mole at Unije are each marked by a light. A signal station is on Rt Vnetak.

Anchorage.—An anchorage, protected from the bora, is situated in the bight between Rt Arbit and Rt Vnetak in 10 to 14 fathoms over sand with Unije church, seen over the low isthmus, bearing 008° , about $\frac{3}{4}$ mile offshore. Another anchorage berth with a diameter of about 640 yards lies in the cove at Unije, about midway between an above-water rock at the southwestern entrance point and the northeastern shore, with the church bearing about 112° in a depth of 9 to 14 fathoms over sand.

11D-9 Hrid Galiola ($44^\circ 44'$ N., $14^\circ 11'$ E.), rocky and 11 feet high, is situated on the eastern side of the entrance to Kvarner, 5 miles west-northwestward of the northern extremity of Ostrvo Unije. The islet is closely bordered by a reef, which to northeastward extends 300 yards. A light is shown from this rock.

11D-10 Ostrvo Lošinj—General description.—Ostrvo Lošinj is about $16\frac{1}{2}$ miles long and varies in width from about 80 yards, at one of the isthmuses uniting its mountainous heights, to about $2\frac{1}{2}$ miles at its widest part. From a distance it appears as three islands, the northwestern and southeastern extremities being higher than the remainder. Its coastline is generally high, broken and indented, with deep water around it. Vrh Kalvarija, 768 feet high, with a chapel on its summit, lies in the southern part of the island, which is cultivated with vines and olive trees and contains pasturage. The northern part is hilly and barren, and about 3 miles from the northern end stands Vrh Osor, consisting of three conspicuous peaks, 1,929 feet high.

Southwestern side of Ostrvo Lošinj.—From Rt Kornu, the western side of the southern extremity of Ostrvo Lošinj, the coast trends $4\frac{1}{4}$ miles northwestward to Luka Čikat, forming several coves. The coast rises steeply to the range of hills and is covered with bushes and olive groves in places. The bora here is more moderate than in other localities. From Luka Čikat to Rt Beli, 3 miles northwestward, the coast is lower and much indented. The slopes of the peninsula of which Rt Beli is the southern extremity, are gentle and partly cultivated.

Luka Čikat, a small well sheltered inlet, is entered from westward through an entrance 260 yards wide, in which there are depths of 11 to 16 fathoms. There is an anchorage berth, 230 yards in diameter, in the inlet in $5\frac{1}{2}$ to 12 fathoms. A small T-headed pier with a depth at its head of about 13 feet is situated on the eastern side of the northern entrance point. A chapel on the southern entrance point and a church in the town of Mali Lošinj, about $\frac{3}{4}$ mile eastward, are conspicuous. A light is shown from an octagonal tower, 23 feet high, close off the southern entrance point.

11D-11 Luka Lošinj Mali, an inlet 3 miles long, varying in width from 460 to 790 yards except at its northwestern and south-

eastern terminal heads, is entered on the southwestern side of Ostrvo Lošinj between Rt Križa ($44^{\circ}34' N.$, $14^{\circ}26' E.$), the northern extremity of Ostrvo Koludarac, 2 miles north-northwestward of Luka Čikat, and Rt Torunza, 510 yards farther north-northwestward. Luka Lošinj Mali is considered one of the best and most convenient harbors in the northern Adriatic.

Two islets lie near the entrance, Otočić Mutar, close southwestward of Rt Križa, and Otočić Zabodacki, $1\frac{1}{4}$ miles west-southwestward of the same point. Otočić Zabodacki consists of weather-beaten stones and shows up well against the background of the eastern shore. These two islets should not be approached closer than 150 yards.

A light is shown on the northwestern side of Otočić Zabodacki.

This inlet, which is situated at the lowest and narrowest part of Ostrvo Lošinj, has its northeastern side backed by a range of hills whose summit rises to 410 feet directly northeastward of the entrance; the hills decrease in height southward, about $1\frac{1}{2}$ miles, to the narrowest part of the isthmus.

The controlling depth in the fairway of the entrance is about 12 fathoms. In the inlet southward of the northern entrance point, there are depths of $7\frac{1}{2}$ to 23 fathoms clear of the shoal with depths of less than 5 fathoms that borders the shore for a distance of from 45 to 150 yards. The two heads of the inlet are shallow. Rt Križa is bordered northward for 160 yards, and Rt Torunza, southeastward for 95 yards, by shallow water with depths of less than 5 fathoms. The bottom mostly consists of mud and weed, good holding ground, but it is rocky in the entrance and in places along the shores.

The town of Lošinj Mali, population about 4,000, is situated on and near the shore of the southeastern head of the inlet. The northeastern shore and part of the southwestern shore at the town is quayed. A mole, about 290 feet long with an alongside depth of about 16 feet, projects a short distance from the line of quays abreast the custom-

house on the northeastern side of the harbor. A small boat channel cut through the isthmus connects Luka Lošinj Mali and Lošinjski Kanal to eastward.

The following named positions are each marked by a light: the southwestern side of Otočić Mutar, from which station is also sounded a fog signal; Rt Torunza, the northern entrance point; Rt Križa, the southern entrance point; Rt Poljana, on the northeastern side of the harbor; and each of the two corners of the mole.

Anchorage.—Large vessels can anchor almost anywhere in Luka Lošinj Mali where there is sufficient width for swinging. The largest berth with a diameter of about 550 yards, in 8 to 19 fathoms, lies with its center in the middle of the inlet about 480 yards south-southwestward of Rt Poljana, a point on the northeastern side of the inlet about $\frac{3}{4}$ mile southeastward of the entrance. Vessels are advised to avoid anchoring in the area about $\frac{1}{2}$ mile northwestward of the customhouse where the isthmus is low and narrow; here the bora is felt in full force and the holding ground is bad. There are several mooring buoys in the harbor.

Directions for entering.—Vessels bound for Luka Lošinj Mali should steer for the lowest part of Ostrvo Lošinj, and, on near approach, the town on a hill at the southeastern part of the harbor will be plainly seen. The ruin on the hill northeastward of the entrance, bearing 049°, leads through the entrance. Rt Križa should be rounded at a distance of not less than 200 yards, after which a midchannel course for the town may be steered.

The passage between Rt Beli and Otočić Zabodacki may be used in the approach. At night, the vessel should keep in the white sector of Rt Torunza Light between the bearings of 065° and 072°, keeping to the southern limit of the sector off Rt Beli and to the northern limit off the islet.

Luka Artatoranj, situated close northwestward of the entrance to Luka Lošinj Mali, is a bay nearly 1 mile long entered between Rt Torunza and a point about $\frac{3}{4}$ mile westward; its sides are narrowly bordered

by shallow water. The head of the bay is shallow and rocky. Vrh Dvorac, 269 feet high, stands on the eastern side. There is an anchorage berth, 300 yards in diameter, in $5\frac{1}{2}$ to 12 fathoms, west-southwestward of Vrh Dvorac. At the entrance to the bay there is another berth, 600 yards in diameter, in $7\frac{1}{2}$ to 22 fathoms.

Rt Beli, situated nearly 1 mile west-southwestward of the entrance of Luka Artatoranj, can be distinguished by its whitish color. Rt Kurila, the southeastern entrance point of Unijski Kanal, lies 1 mile west-northwestward of Rt Beli. Uvala Slatina lies about 1 $\frac{1}{2}$ miles south-southeastward of Rt Križa.

A submarine cable extends in a general west-southwesterly direction from a point on the shore about $\frac{1}{3}$ mile northeastward of Rt Križa to Luka Susak (sec. 11D-6). Another submarine cable closely parallels the cable above for a distance of about 1 $\frac{1}{2}$ miles, thence in a westerly direction for about 1 mile.

11D-12 Unijski Kanal.—This large and partially landlocked passage between Ostrvi Unije and Srakane, on the western side, and Ostrvo Lošinj, on the eastern side, affords a safe refuge for a large number of vessels. The local fishermen report that a large fleet might ride out a gale here in complete security. The bottom consists of sand and mud.

The constant coastal north-going current of about 0.4 knot is affected by the tide and winds. With a persistent scirocco and a flooding tide, the current at the southern entrance of Unijski Kanal sometimes attains a velocity of from 2 to 2.5 knots.

Unijski Kanal is entered southward between Rt Kurila ($44^{\circ}34'$ N., $14^{\circ}22'$ E.) which is marked by a light, and Hrid Silo (sec. 11D-7), about 1 mile westward.

On the eastern side of Unijski Kanal, from Rt Kurila, the western shore of Ostrvo Lošinj trends 9 miles northward to Rt Osor, the rocky northern point of the island; the point rises steeply from the sea to Vrh Osor (sec. 11D-10).

Hrid Karbarus, 10 feet high and bare, lies $1\frac{3}{4}$ miles northward of Rt Kurila and about

$\frac{1}{4}$ mile off the shore to which it is connected by a reef with shallow depths.

Luka Liški, situated on the eastern side of a point lying about $\frac{1}{2}$ mile east-northeastward of Hrid Karbarus, affords shelter to small vessels in southerly winds, but it is rather exposed to the bora.

On the western side of the channel there are several coves providing limited shelter for small craft.

Unijski Kanal is entered from northward between Rt Lakunji, the northern extremity of Ostrvo Unijske, and Rt Osor, 3 miles north-eastward. A rock, with a depth of less than 6 feet and marked by a pole beacon, lies close off Rt Osor.

A light is shown on Rt Lakunji.

Anchorage is prohibited in the region of a line connecting Rt Arbit with Luka Liski.

11D-13 On the eastern side of Kvarner, the western coast of Ostrvo Cres, between Rt Osor and Rt Tiha, $5\frac{3}{4}$ miles northward, forms a large bight to eastward in which are located three bays: Osorski Zaliv, at the southern end; Ustrinska Luka, at the southeastern part; and Luka Martinšćica, at the northern end.

Ostrvo Zečevo lies with its northern point $1\frac{1}{2}$ miles southwestward of Rt Tiha. The island is about 2 miles long, $\frac{1}{2}$ mile wide, and rises to a height of 220 feet at its southern end. Its light color shows up well against the shore of Ostrvo Cres. With the exception of its steep-to southwestern shore, the island is bordered by shallow water and above-water rocks for a distance of 500 yards in places. The southwestern side of the island is marked by a light.

Otočić Visoki, 24 feet high, lies eastward of Ostrvo Zečevo and $\frac{3}{4}$ mile off the coast of Ostrvo Cres. Except on its northern side, the islet is bordered by a reef, as much as 500 yards wide in places. A 5-fathom isolated patch lies $\frac{3}{4}$ mile northward of the island. A light is shown on the northwestern side of Otočić Visoki.

11D-14 Osorski Zaliv is entered between Rt Osor ($44^{\circ}43' N., 14^{\circ}21' E.$) and Rt Tanka, on the western coast of Ostrvo Cres, $2\frac{1}{4}$

miles east-northeastward. At its head, this bay communicates with Lošinjski Kanal through Osorski Vrata. Hrid Seka lies close off a point, situated 800 yards eastward of Rt Osor, but otherwise the shores of the bay, which are indented, are steep-to at a distance of about 70 yards. The village of Osor, population about 350, stands on a hill on Ostrvo Cres close to Ostrvo Lošinj, to which it is connected by a swing bridge.

Uvala Bijar, situated on the eastern side of the bay directly northward of Osor, affords shelter to small vessels from all winds. Two small moles enclose a boat basin at the northeastern side of the cove. A light is shown from its northern entrance point. A light is shown on the head of the pier.

Osorski Zaliv affords good anchorage for vessels in 21 to 25 fathoms northwestward of Osor.

Osorski Vrata (sec. 11B-39) lies between Ostrvo Cres, on its eastern side, and the northern end of Ostrvo Lošinj, on its western side. This channel is from 20 to 26 feet wide, about 1,148 feet long, and has a depth of about 8 feet. A mooring buoy is secured in its northern approach.

The quayed sides of the channel are connected by a steel swing bridge which is opened on request and in accordance with special regulations, copies of which may be obtained from any Port Authorities Office in Yugoslavia.

Caution.—Electrical wires, about 49 feet above water, extend across the narrows north of the steel swing bridge.

Currents in the channel are very irregular, and the water level varies greatly at times.

Navigational aids in the channel are often swept away by storms.

Ustrinska Luka is entered between a whitish point of land, $2\frac{1}{2}$ miles northeastward of Rt Osor, and a bare, dark-colored point, $\frac{1}{2}$ mile north-northwestward. The village of Ustrine is located at an elevation of 590 feet close eastward of this bay. There is an anchorage for small craft sheltered from all winds in about 5 fathoms over good holding mud in the northern part of the bay.

Luka Martinšćica, the entrance to which is about $\frac{1}{2}$ mile wide and open southward, lies eastward of Rt Tiha. The sides of the bay are narrowly bordered by shallow water; the head of the bay is shallow. The village of Martinšćica, population about 550, lies at the head of the bay and has a small mole with $6\frac{1}{2}$ to 11 feet alongside. The head of the mole is marked by a light.

The bay is protected from the bora, which often sets in without warning.

Large vessels can anchor in the entrance to Luka Martinscica in about 22 fathoms, and small vessels anchor in the center of the bay in 2 to 3 fathoms.

11D-15 From Rt Tiha, the western coast of Ostrvo Cres on the eastern side of Kvarner, trends $8\frac{3}{4}$ miles northward to Rt Pernat, the northern extremity of the western part of the island. Vrh Helm (sec. 11C-26), about 3 miles northward of Rt Tiha, and the village of Lubenice, elevation 1,240 feet, about $1\frac{1}{4}$ miles farther northward, are conspicuous.

Rt Zaglav is the extremity of the northwestern fork of a promontory that extends $\frac{1}{2}$ mile westward from the coast, $2\frac{1}{2}$ miles south-southwestward of Rt Pernat. A ruin stands on the promontory at an elevation of 302 feet. Hrid Zaglav, situated about $\frac{1}{2}$ mile northwestward of Rt Zaglav and the same distance offshore, rises slightly above the sea near the southwestern end of a reef over which there are depths of 9 to 12 feet. The rock is marked by a light.

Rt Pernat ($44^{\circ}57' N.$, $14^{\circ}19' E.$), conspicuously steep and bare, is situated about 2 miles northeastward of Hrid Zaglav. A framework structure painted in red and white diagonal stripes stands on the point. The land rises $1\frac{3}{4}$ miles southward of the point to Vrh Grabrovica, 1,020 feet high, and between this summit and the point, a village with a chapel stands prominently at an elevation of 761 feet.

11D-16 Creski Zaliv is entered between Rt Pernat and Rt Sveti Blaž, $3\frac{1}{2}$ miles north-northeastward. The sides of the bay are

steep-to, except in the southeastern part where they are bordered narrowly by shallow water; the shores are backed in places by cultivated areas. The bay is open to northerly and northwesterly winds, and the bora is felt severely. The best anchorage for a large vessel is about 800 yards from the eastern shore in a depth of about 27 fathoms over good holding ground just southward of a point about 3 miles eastward of Rt Pernat. The best anchorage for small craft is in a cove southward of the mentioned point of land where the depth in the entrance is 5 fathoms. Vessels should avoid the fish nets commonly used in this bay. The village of Valun lies on the western side of the head of the bay and contains some large buildings. A mooring buoy for small vessels is located in front of the village. Vrh Perska, 1,407 feet high, stands about 2 miles southeastward of Valun.

Luka Cres ($44^{\circ}58' N.$, $14^{\circ}24' E.$), though small, is an excellent and protected harbor. It lies on the eastern side of Creski Zaliv, directly eastward of Rt Pernat. The harbor consists of an inlet about 1 mile long, entered between Rt Križice, on the southern side, and Rt Kovačine, 570 yards northward, on the northern side. From the entrance the inlet extends eastward between approximately parallel shores, widening eastward of Rt Mlinski Kamen, on the northern shore about 1,300 yards east-southeastward of Rt Kovačine. The depths vary from 25 fathoms at the entrance to about 6 fathoms in the middle of the eastern part of the harbor. With the exception of the northern and southeastern coves and the extreme eastern part, which are shallow, the shores are bordered by a reef with depths of less than 5 fathoms for a width of about 110 yards in places.

The town of Cres, population about 3,600, is walled and is built around an inner harbor at the northeastern side of the inlet. A mole, 164 feet long, projects southwestward from the southern end of the town where there are alongside depths of 11 to 18 feet. A

mooring buoy is secured in the center of the harbor southward of the mole. North-northwestward of the mole there is a small harbor protected southward by two moles with depths of 10 to 14 feet in the middle. The sides of the inner harbor are quayed, and, in front of the town there is a boat basin.

The following named positions are each marked by a light: Rt Križice, the southern entrance point; Rt Kovačine, the northern entrance point, and from which station a fog signal is sounded; Rt Mlinski Kamen, on the northern side of the inlet; and the head of the mole near the entrance to the inner harbor.

Large vessels can not anchor in the harbor without fouling the mooring buoy. The bottom is good holding mud. The mooring buoy berth has a diameter of about 465 yards over depths of $5\frac{1}{2}$ to 12 fathoms. For the protection of oyster beds, anchoring is prohibited southward of a line joining Rt Križice and the convent of Sveti Benedikt, located on the eastern shore of the harbor.

Directions for entering.—To avoid the reef extending southward from Rt Mlinski Kamen, a vessel, after passing between the entrance points, should favor slightly the southern shore, or keep Rt Kovačine Lighthouse in sight astern bearing about 297° .

The western coast of Ostrvo Cres, between Rt Sveti Blaž and Rt Prestenice, $7\frac{3}{4}$ miles north-northwestward, is precipitous, and broken, with several streams visible from seaward. A dangerous wreck lies about $1\frac{1}{2}$ miles north-northwestward of Luka Cres entrance. A conspicuous church stands close northward of Rt Sveti Blas.

WESTERN SIDE OF KVARNER

11D-17 Luka Kuje ($44^{\circ}49' N.$, $13^{\circ}59' E.$), a small inlet, is entered about $1\frac{1}{2}$ miles northwestward of Rt Marlera (sec. 6B-1). The inlet is sheltered from all winds but is suitable only for small vessels. The best anchorage is in the southeastern part in about $3\frac{1}{2}$ fathoms over good holding sand.

A white quarry with a road southward of the inlet serves as a mark.

Hrid Sika, just above water, lies midway between Rt Marlera and Luka Kuje near the outer end of a reef that extends from 100 to 500 yards offshore. The rock is marked by a beacon which has been reported to be partly demolished; however the rock is conspicuous by the way the waves break on it.

Between Luka Kuje and Luka Budava, 4 miles northward, the coast is high, steep, and wooded.

Luka Budava is entered between Rt Cuf, a whitish, rocky point, 180 feet high, and Rt Seka, $\frac{3}{4}$ mile northeastward. An above-water rock lies on the end of a shallow reef which extends about 300 yards southward from Rt Seka. The inlet extends westward and then northwestward, but the latter part is shallow; the sides are high and covered with shrubs. A house with a red roof stands on the western shore, and the Health Office, off which there is a small mole, is situated on the northeastern side of the inlet. Anchorage in depths of 7 to 11 fathoms, good holding, can be had about 450 yards southeastward of the house with the red roof.

Luka Vinjole, situated $2\frac{1}{4}$ miles northeastward of Rt Cuf, affords anchorage for small vessels in 3 to 8 fathoms over good holding sand in two coves, one on each side of the bay. A rock with a depth of 1 foot over it lies nearly midway between the entrance points.

Luka Krnica is entered between Rt Mulac, about $2\frac{1}{4}$ miles north-northeastward of Luka Vinjole, and a point $\frac{1}{2}$ mile southward. The sides of this inlet are high; the depths gradually decrease towards the head which is shallow. The inlet is narrow but affords shelter to small vessels from all except southeasterly winds. Vessels can anchor in the inner part in depths of $3\frac{1}{2}$ to $5\frac{1}{2}$ fathoms over hard mud, and lay out a hawser northeastward. There is a Health Office at the

head of this inlet and the village of Krnica is situated about $1\frac{1}{2}$ miles northwestward of it at an elevation of 702 feet.

Zaliv Raša (sec. 11D-23) is entered between Rt Mulac and Rt Ubas, $\frac{1}{2}$ mile eastward.

From Rt Ubas, the coast trends 4 miles northeastward and eastward to Crna Punta, a high, dark-colored, thickly wooded, steep-to point which is visible from a considerable distance, as is Vrh Goli, 1,765 feet high, about 4 miles northward, of which the point is a spur. The point is marked by a light; a fog signal is sounded at the light station. A beacon stands about 600 yards northwestward of Crna Punta.

Uvala Koromačna, open southward, lies close westward of Rt Koromačno, 1 mile westward of Crna Punta. The bay affords shelter to large vessels against the bora. The best anchorage is in the position with Rt Koromačno in range with Crna Punta, bearing about 110° , in about 25 fathoms over good holding mud. Rocky bottom exists closer inshore. On the eastern shore of the bay is a cement factory fronted by a quay with a depth of about 16 feet alongside. The quay is served by two electric cranes.

LUKA RAŠA (LUKA BRŠICA)

Position: $45^\circ 02' N.$, $14^\circ 03' E.$

Depths:

Inlet, 5 to 25 fathoms.

Quays, 11 to 29 feet.

Port plan: Section 11D-25.

11D-18 Luka Raša (Valdivagna) lies at the mouth of Rijecka Raša at the head of Zaliv Raša (sec. 11D-17), a narrow, deep, irregular inlet about 6 miles long. In addition to Luka Raša, there are two other but small minor ports in Zaliv Raša, Luka Gradaz (Luka Gradac) (Uvala Tunarica) and Luka Trageta.

11D-19 Current and wind.—A variable current follows the axis of Zaliv Raša; it is slight at its northern head. In exceptional cases, and during a strong scirocco, the water in the inlet may rise nearly 6 feet; the latter will produce a heavy sea as far as Rt Sveti Mikula.

Easterly winds predominate in winter, the bora being especially strong. In summer, the breeze usually follows the axis of the channel; sometimes a fresh northeasterly breeze of short duration is experienced.

Magnetic disturbance has been observed in Zaliv Raša, especially off Trageta.

11D-20 Depths.—The sides of the inlet are steep-to, except for a cove on the western side, $3\frac{1}{2}$ miles north-northwestward of Rt Ubas, and the northern shallow part where Rijeka Raša discharges into the inlet near Rt Bršica. The depths decrease gradually from 25 fathoms at the entrance to about 5 fathoms at Rt Bršica. The depths in the usual anchorages are from $6\frac{1}{2}$ to 19 fathoms.

11D-21 Landmarks.—The entrance can be identified by Vrh Ubas, 298 feet high, situated 1 mile north-northeastward of Rt Ubas. A chimney is near the village at the northeastern corner of the bay. Also prominent are Crna Punta, Vrh Goli, and the village of Krnica, all previously described in section 11D-17.

11D-22 Anchorages. — Vessels may anchor on either side of Zaliv Raša, but as the depths increase rapidly towards the middle, bora squalls would probably cause the anchor to drag considerably before bringing up, and it is therefore advisable to lay out an anchor northeastward. Vessels anchoring should favor the eastern shore. The best anchorage is in Luka Gradaz where the bora is less squally than in the other places in the inlet. Directly southward of the northern entrance point of Luka Gradaz a vessel will find a berth, 450 yards in diameter, in 13 to 19 fathoms; a vessel should anchor on a southwesterly heading and make the stern fast to the shore. In the roadstead off Trageta there is a berth, 700 yards in diameter, in $6\frac{1}{2}$ to 9 fathoms over good holding gravel.

Anchorage off Luka Raša is available south-southeastward of the Port Authorities Office. It is absolutely necessary to secure vessels to the shore as the mud bottom offers poor holding ground.

11D-23 Zaliv Raša, the approach to Luka Raša, is an irregular inlet which pursues a general north-south direction for 6 miles and has a width of about 670 yards at its narrow-

est part. Both sides are steep and partly bare, and are steep-to except as described in section 11D-20. Zaliv Raša may be considered to have three reaches.

The first reach, about 2 miles long, extends north-northeastward from the entrance points, Rt Ubas, on its eastern side, and Rt Mulac, on its western side, to Rt Sveti Mikula, on the western side and around which the channel turns northward. Rt Kučica lies on the eastern side of the channel about $1\frac{1}{2}$ miles north-northeastward of Rt Ubas. Luka Gradaz is entered between Rt Kučica and a point $\frac{3}{4}$ mile northeastward. A light is shown from a point located about 1 mile east-northeastward of Rt Kučica. Tunny nets are moored in the eastern part of the bay. The northern foot of Vrh Ubas forms the southern side of the bay.

The middle reach extends north-northwestward nearly 1 mile to Rt Prašćarica on the western side, thence, west-northwestward for about 1 mile to a point on the northeastern side at the foot of Vrh Frumento, 500 feet high.

The last reach extends from the point at Vrh Frumento northward for $1\frac{3}{4}$ miles to the marshes of the valley of Rijeka Raša. The village of Trageta lies on the eastern side of this reach about 1 mile northward of Vrh Frumento, and at Rt Bršica, $\frac{1}{2}$ mile farther northward, is situated Luka Raša. Farther northward, a shallow canal leads to the coal mining district.

Lights mark each of the following described positions: Rt Ubas, Rt Mulac, Rt Kučica, Rt Sveti Mikula, Rt Prašćarica, the point at the foot of Vrh Frumento; and the point northwestward of Trageta.

11D-24 Pilotage is compulsory. Vessels bound for berths at Luka Raša will be boarded by a pilot in the anchorage at Trageta. Pilots are available day and night.

11D-25 Luka Gradaz (Luka Gradao) (Uvala Tunarica).—In the southeastern part of this bay there is a quay extending about 130 feet in a north-south direction and which projects about 20 feet from the shore. There is a depth of 8 feet at a distance of about 5 feet from this quay.

Luka Trageta.—This small port which fronts the village of Trageta, population about 400, consists of

two small piers available for boats only. There is a Health Office at Trageta.

Luka Raša.—The berthing facilities consist of two moles and two quays. Vessels with a length up to 525 feet and a draft of 29 feet can be berthed at the heads of the two moles where there are numerous mooring buoys used for securing.

A 7-headed mole southwestward of Rt Bršica is fitted with a belt conveyor for rapid coal loading. This mole is 230 feet long, 69 feet wide at its head where there is a depth of 29 feet.

The other mole, 39 feet wide, extends 115 feet from Rt Bršica. There is a depth of 29 feet at its head. Loading is accomplished at this mole by two loading cranes working directly out of railway cars.

The concrete quay between the two moles is used by vessels of lesser tonnage. The depths alongside this quay vary from 11 to 18 feet.

The second quay extends northward from Rt Bršica at the entrance to the canal. The berths here are dredged to a depth of $19\frac{1}{2}$ feet for the southernmost 656 feet of the quay's length.

Water can be obtained in unlimited quantities from hydrants on the quays.

There is a customhouse at Raša.

WESTERN SIDE OF KVARNER

(Continued)

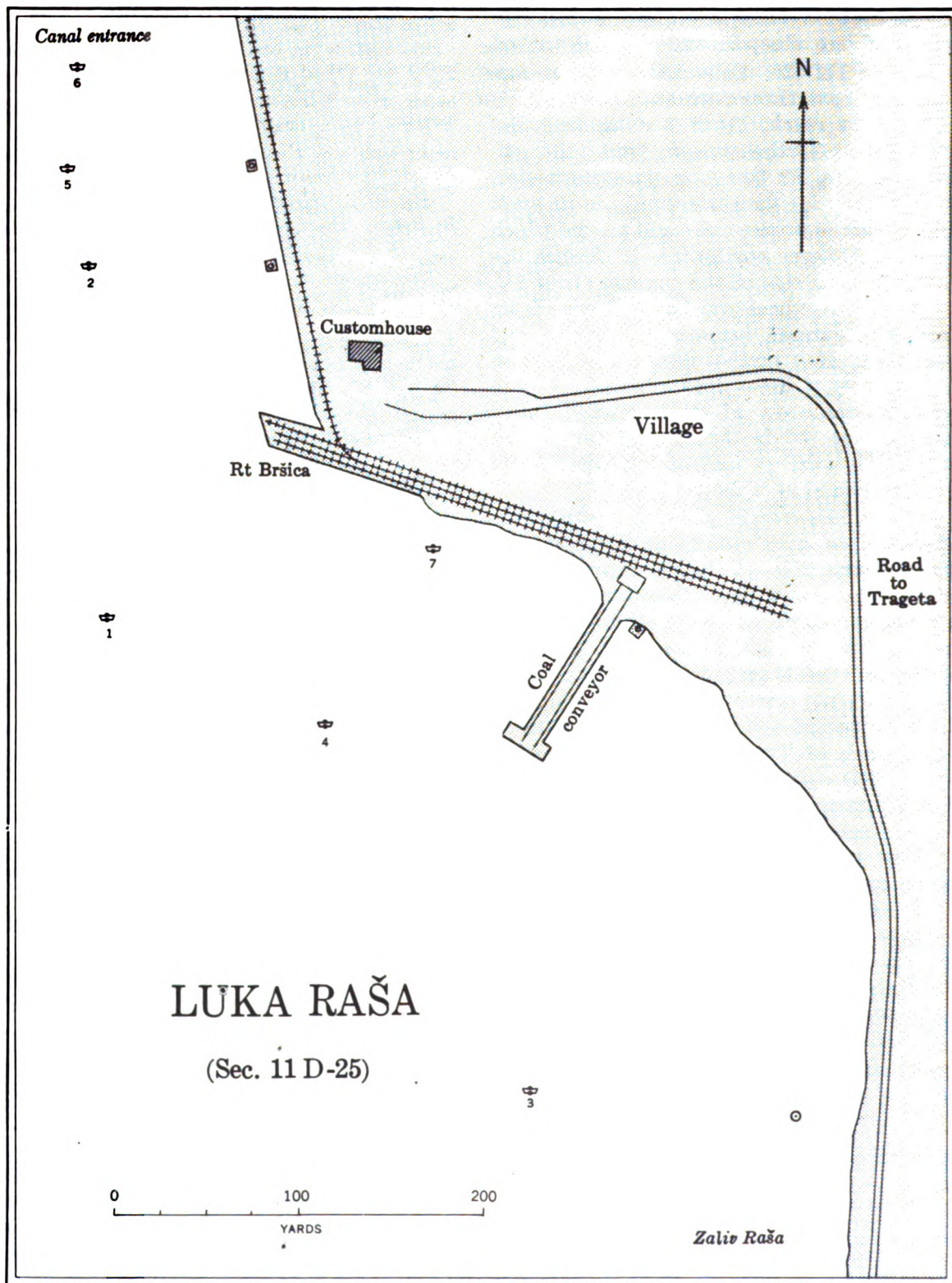
11D-26 The coast between Crna Punta and Rt Sveta Marina, $4\frac{1}{2}$ miles northward, is bold, indented with small coves and is steep-to.

Luka Prklog is entered between Rt Sveta Marina, on which there is a chapel, and Rt Prklog, $\frac{1}{2}$ mile northward. This inlet is too small to be entered except by small vessels, which can moor with a hawser laid out to the shore southward, in a position westward of the houses on the northeastern side, about $\frac{1}{2}$ mile from the entrance, where there is a depth of about 19 fathoms over good holding ground.

Rt Sveti Juraj with a church on it lies about 1 mile north-northwestward of Rt Prklog. A reef with a depth of less than 6 feet near its outer edge extends about 200 yards northeastward from this point.

Rt Sveti Andrija lies $\frac{3}{4}$ mile north-northeastward of Rt Sveti Juraj. This point is bordered for about 150 yards with shallow water.

Luka Rabac ($45^{\circ}05' N.$, $14^{\circ}09' E.$), situated in an inlet westward of Rt Sveti Andrija which is marked by a light, affords shelter from westerly and northwesterly winds but



southerly and southeasterly winds are severely felt and the bora sweeps the port in violent gusts. Depths vary from 12.8m (71m) to 50m (27 fm) in the southern part of the inlet; the head is shallow.

The village of Rabac is situated close inland from a bight in the northeastern side of the inlet. Conspicuous from a distance are the campanile in the town of Labin located on a hill, 1,050 feet high, about 1½ miles west-northwestward of Rabac, and the reddish bauxite silos at Rabac. On the eastern side of the before-mentioned cove there is a small pier, on which a light is shown, and a quay extending northward and southward from it; the depths alongside are about 2.7m (9 ft.) to 4.2m (14 ft.). A breakwater extending westward about 460 feet is under construction close southward of the quay. A berth for loading minerals extends from the western shore of the inlet near its mouth.

Anchorage.—Vessels of medium size can anchor in the middle of the inlet southwestward of the breakwater where there is a berth, 400 yards in diameter, in 16.5m (9 fm) to 50m (27 fm) over good holding ground, and small vessels can anchor near the northeastern shore. A mooring buoy is in the harbor.

Plominska Luka, a deep water inlet about 1¼ miles long and open to southeastward, lies between steep, high shores about 3 miles north-northeastward of Rt Sveti Andrija. Its northeastern entrance point is Rt Mašnjak which is steep, bare, and rises to a height of 810 feet close northward of its extremity. The entrance of the inlet is only about 600 yards wide, narrowing towards its head, and is, therefore, not frequented by large vessels. About ½ mile within the entrance the inlet turns north-northwestward which provides some protection at its head from the heavy seas sent in by the sirocco. The inlet is visited by boras of extraordinary violence which are deflected by the steep lee coast in southwesterly squalls. There is no recommended anchorage.

At the village of Plomin on the northeastern shore of the head of the inlet there is a quay about 656 feet long with an alongside

depth of about 4.9m (16 ft.). About 80 feet of the central portion of this quay is demolished. On the southwestern shore of the inlet, about 875 yards from the quay, there is a small steel and concrete pier at which vessels, moored between two buoys, can load minerals to a draft of 9.7m (32 ft.).

There are three sunken mooring buoys in the harbor, one is about 90 yards east-southeastward of the head of the pier for loading minerals, the second is about 110 yards north-northwestward of the same pier, and the third in the center of the channel opposite the southeastern extremity of the quay. The last two described buoys are dangerous on the falling tide.

KANAL VELA VRATA

11D-27 The general description of Kanal Vela Vrata and the current therein are described in sections 11D-2 and 11D-5, respectively.

Rt Prestenice (45°07' N., 14°16' E.), the southeastern entrance point of Kanal Vela Vrata, continued from section 11D-16, is the westernmost point of the northern end of Ostrvo Cres, and is marked by a light, from which station is sounded a fog signal.

A submarine cable is laid across Kanal Vela Vrata, in a west-northwesterly direction, from a position about 2/3 mile north-westward of Rt Prestenice.

Luka Porozina, on the eastern side of the channel, lies 1 mile northeastward of Rt Prestenice. This cove, at the head of which lies the conspicuous village of Porozina, has a small craft basin protected to southward by a mole, 125 feet long. There is a depth of 4.9m (16 ft.) at the mole head, which is marked by a light.

From Luka Porozina the northern part of Ostrvo Cres trends 3 miles north-northeastward to Rt Jablanac, the northeastern entrance point of Kanal Vela Vrata.

The western shore of the channel between Rt Mašnjak, the southwestern entrance point, and Rt Šip, the northwestern entrance point, 4 miles north-northeastward is steep except for about ¾ mile northward of Rt Mašnjak where the shore is narrowly bordered by a reef.

Anchorage is prohibited near a line connecting Luka Porozina and Uvala Stupova, about 2 1/3 miles north-northeastward of Rt Masnjak.

The village of Brseč is conspicuous atop a steep hill, 548 feet high, situated close to Rt Šip. Small craft can secure a few yards off a short quay at the foot of this village.

WESTERN PART OF RIJEČKI ZALIV

11D-28 The general description of Riječki Zaliv is given in section 11C-32.

Northward of Mošćenička Draga, situated 3 1/4 miles northward of Rt Šip, the coast presents a less desolate appearance than it does farther southward. A few villages and patches of cultivation are visible, especially in the vicinity of Rijeka and on the slope of Vrh Učka, situated about 3 1/2 miles westward of Rt Lovran. The coast is almost everywhere high, abrupt, bordered by deep water and without any shelter, except a few boat harbors protected by moles, and the small harbors of Ika, Opatija, Volosko, and Preluk.

Mošćenička Draga (45°14' N., 14°15' E.) offers temporary anchorage to small craft in fine weather. The southeastern corner of the quay is marked by a light. It is dangerous to moor to the outer end of the quay in bad weather. Water can be obtained from hydrants on the quay.

Close northward of Rt Cesara, situated 2 miles north-northeastward of Mošćenička Draga, there is a conspicuous valley containing a torrent. A yellow house with a red roof stands on the point.

Luka Lovran is situated at Rt Lovran, on which is located the village of the same name, 1 1/2 miles northward of Rt Cesara. This small port consists of a boat basin, a pier, and a stone mole. A light is shown at Luka Lovran.

Luka Ika consists of a small pier, about 197 feet long, with a depth of 5.5m (18 ft.) at its head, extending from the shore of a cove situated nearly 1 mile northward of Rt Lovran. The head of the pier is marked by a light.

Vessels should avoid anchorage in the southwestern part of Uvala Ika as there are many deep holes which may cause the loss of an anchor. During southeasterly winds, anchorage is dangerous anywhere in the bay.

Luka Opatija is situated 2 1/4 miles north-northeastward of Luka Ika at the town of the same name. A mole extends about 420 feet north-northeastward from a quayed portion of the town's shore, forming with the shore westward, a basin about 180 feet wide. Small vessels drawing less than 11 feet can secure at the inner side of the mole, the head of which is marked by a light.

Large vessels can anchor 1/2 mile eastward of the mole in 48m (26 fm) over good holding ground. Smaller vessels can anchor farther inshore.

The town of Opatija, population about 6,000, is a notable health and bathing resort. The shores are lined with numerous hotels and villas. A church with a campanile stands on a hill, 1,640 feet high, which dominates the town and harbor.

11D-29 Luka Volosko is situated 3/4 mile northeastward of Luka Opatija. The town of Volosko, population about 3,000, is a suburb of Opatija and extends about 1/4 mile along the coast on the slopes of the hills backing the shore.

The harbor with a depth of about 3m (10 ft.) is formed to southward by a 295-foot breakwater extending northeastward, and to northward by a 197-foot mole extending eastward, leaving an entrance about 275 feet wide. The northern side of the breakwater which is quayed will accommodate a vessel 197 feet long with a draft not exceeding 13 feet. The harbor between the roots of the breakwater and mole is quayed and contains a boat basin. The heads of the breakwater and the mole are each marked by a light.

Luka Preluk, a bay at the extreme head of Riječki Zaliv, entered 1/2 mile northeastward of Luka Volosko, has a width of about 800 yards and indents the shore about 600 yards. A rock with a depth of less than 1.8m (6 ft.) lies near the eastern entrance point. The bay can be recognized from seaward by a large

reddish stone quarry. There are several mooring buoys and wooden stages used by small craft transporting stone. A vessel can anchor just inside the entrance in 29m (16 fm) to 39m (21 fm).

CAUTION.—Tunny nets are laid off Luka Preluk from June to October.

Eastward of Luka Preluk, the COAST turns abruptly east-southeastward and so continues steep and rocky for 2 3/4 miles to Luka Brgud, the westernmost port facility of Rijeka Luka, which is described in section 11D-31.

ANCHORAGES

11D-30 KANAL VELA VRATA.—Section 11D-2.

OSTEVO SUSAK.—Section 11D-6.

OSTEVO UNIJE.—Section 11D-8.

LUKA CIKAT.—Section 11D-10.

LUKA LOSINJ MALI.—Section 11D-11.

LUKA ARTATOBANJ.—Section 11D-11.

OSORSKI ZALIV.—Section 11D-14.

LUKA USTRINE.—Section 11D-14.

LUKA MARTINSCICA.—Section 11D-14.

CRESKI ZALIV.—Section 11D-16.

LUKA CRES.—Section 11D-16.

LUKA KUJE.—Section 11D-17.

LUKA BUDAVA.—Section 11D-17.

LUKA VINJOLE.—Section 11D-17.

LUKA KRNICIA.—Section 11D-17.

UVALA KOROMACNA.—Section 11D-17.

ZALIV RASA.—Section 11D-22.

LUKA PRKLOG.—Section 11D-26.

LUKA RABAC.—Section 11D-26.

LUKA OPATIJA.—Section 11D-28.

LUKA PRELUK.—Section 11D-29.

RIJECKA-SUSACKA LUKA.—Section 11D-36.

RIJECKA-SUSACKA LUKA

Position: 45°20'N., 14°26'E.

Depths: Approach, over 18.3m (10 fm).

Berths in Rijeka Luka, 3.9m (13 ft.) to 9.1m (30 ft.).

Berths in Susacka Luka, 7m (23 ft.) to 8.5m (28 ft.).

Berths in Petrolejska Luka, 5.2m (17 ft.) to 8.5m (28 ft.).

Berth in Luka Brgud, 7.9m (26 ft.).

Tide: M.H.W.L., 8h.30m.; mean range, 0.8 foot.

Port plan: Section 11D-42.

11D-31 RIJECKA LUKA and SUSACKA LUKA, which are now politically joined, will be described as one port, together with adjacent facilities. The dual port surpasses all others in Yugoslavia in maritime trade, carrying about 80 percent of that country's traffic.

Rijeka Luka, the principal port, is protected by a breakwater which extends about 1,918 yards westward from a position near the mouth of Rijeka Recina, from which the city derives its name. This harbor, which fronts the city, has completely quayed sides and four principal moles.

Susacka Luka, a breakwater protected basin entered from westward, is situated south-eastward of the eastern head of Rijeka Luka, to which it is connected by a narrow opening in the major breakwater. Mrtv Kanal leads into this harbor.

A section of the city known as Brajdica lies close eastward of the mouth of Rijeka Recina. Its facilities include a basin and two piers for boats, and a quay for ocean-going vessels.

Westward of the westernmost mole in Rijeka Luka and extending for about 1 1/4 miles are located a boat basin, a quay, the petroleum port, a basin adjacent to the torpedo works, and a shipyard at Luka Brgud.

NAVIGATION

11D-32 The following described courses and distances from the positions indicated in two of the three approaches to Rijeki Zaliv, will lead to the breakwater entrance at Rijeka Luka:

From a midchannel position at the northern entrance of Kanal Vela Vrata, 032° for 10.8 miles.

From a position in Kanal Srednja Vrata with Rt Glavotok abeam 1 mile to eastward, 001° for 14 miles.

No course is believed necessary for Rijecka Luka from the northern entrance of Tihl Kanal, 8 miles distant. The intervening coast is steep-to and the eye will serve as the best guide.

RIJECKA LUKA LIGHT is shown about 800 yards northward of the head of Generala Petra Drapsina Breakwater, which encloses the southern side of Rijecka Luka.

CURRENT, TIDE AND WIND

11D-33 Occasional variable currents produced by winds or the tide are experienced. The mean tidal range in the port is about 0.8 foot. Southerly winds can raise the water level by 2.6 feet.

The bora blows often in squalls of extreme violence. The sirocco predominates in spring and autumn which raises a small sea in the port, particularly in its western part; its approach is indicated by clouds on the summit of Ucka (sec. 11D-28). The bora, on the other hand, is presaged by cirro-stratus on Veli Vrh (sec. 11D-35), whereas, nimbus and cumulo-nimbus precede southwesterly and northwesterly winds.

Although the fetch in Rijecki Zaliv is not more than 10 or 11 miles in any direction, a heavy sea is sent in by southerly winds when they blow directly through Kanal Srednja Vrata.

DEPTHS

11D-34 The depths in the approach to all facilities at Rijecka-Susacka Luka are sufficiently great for the largest vessels, being in excess of 18.3m (10 fm). In Rijecka Luka, there are berths with depths of 3.9m (13 ft) to 9.1m (30ft.); in Susacka Luka, the quays have alongside depths of 7m (23 ft.) to 8.5m (28 ft.); in Petrolejska Luka depths alongside are 5.2m (17 ft.) to 8.5m (28 ft.); and in Luka Brgud, there is a depth of 7.9m (26 ft.) at one berth.

LANDMARKS

11D-35 The best distant landmark is Veli Vrh, 1,412 feet high, situated about 2 miles northward of Rijeka. On close approach, the

concentration of buildings spread along the coast will serve as identification. The most prominent structures are: a white marble church with a spire, located on a hillside less than 1 1/4 miles eastward of Rijecka Luka Lighthouse; the castle ruins and church at Trsat to eastward of Rijeka Recina; a large square stone hospital with red roof and many windows located about 600 yards east-southeastward of Rijecka Luka Lighthouse; and to westward numerous oil tanks, water towers, and the installations at the shipyard. The lighthouse is not conspicuous.

ANCHORAGE

11D-36 An anchorage area, with a width of about 5 1/2 miles, in 53m (29 fm) to 64m (35 fm), has its center about 3 miles southeastward from the entrance to Susacka Luka. The area is subdivided by a line extending about 1 3/4 miles north-northeasterly and about 1 3/4 miles in a south-southwesterly direction from the center. Ships with non-explosive cargo anchor in the larger area westward of the line and ships with explosive cargo anchor eastward of the lines. With strong southerly winds, vessels should be prepared to stand offshore.

Anchoring, fishing and stopping are prohibited in an area extending westward and thence about 7 miles south-southwestward of the entrance to Luka Rijecka; the width of the area is about 2 miles at the shore end and about 3 1/4 miles at the seaward end.

HARBOR—SUSACKA LUKA

11D-37 SUSACKA LUKA lies close south-eastward of the eastern end of Rijecka Luka, and consists of a quayed basin protected to southward and westward by a breakwater; it is entered from westward through an opening about 60 yards wide. The basin is about 400 yards long, about 190 yards wide, and has depths of 6.1m (20 ft.) to 26m (84 ft.). The southern breakwater has a spur projecting about 100 yards west-southwestward from the entrance for protection against seas produced by the sirocco. Gat Barcic projects westward from the southern part of the basin. Within the entrance, on the northern side, there is a narrow opening into Rijecka Luka crossed by a swing bridge.

Mrtvi Kanal, a dead-end, narrow, quayed channel extending about 600 yards north-northeastward, is entered through an opening at the northeastern corner of the basin. It is crossed by two swing bridges. There is a depth of about 5.5m (18 ft.) at its entrance; its head is shallow.

A light is shown on the southern side of the entrance of **Susacka Luka** and another on the northern side of the entrance.

A light buoy is moored 55 yards west of the head of the spur of the southern breakwater.

Eastern side of Sušacka Luka.—Between the eastern sides of **Sušacka Luka** and **Mrtvi Kanal**, on its northwestern side, and **Rijeka Rečina**, on its northeastern side, lies a triangular piece of land with a width of about 500 yards at its base on the southern side. This has sometimes been referred to as the **Delta**, and contains, among other facilities, a lumber yard serviced by several railway tracks. A part of **Supilova Obala**, the quay on the eastern side of **Mrtvi Kanal**, is used by small vessels to load lumber, whereas, larger vessels load lumber at **Bradjica**.

Rijeka Rečina, a narrow stream, obstructed by rocks at its mouth and crossed by several fixed bridges, has no commercial importance except for logging. The stream lies between the lumber yard, previously mentioned, on its western side, and **Brajdica**, on its eastern.

Brajdica.—The facilities at **Brajdica**, located directly eastward of the mouth of **Rijeka Rečina**, consist of a boat basin, flanked on each side by a small pier, and immediately eastward thereof, by a marginal quay. This quay is used chiefly for loading lumber which is stored in a yard close northward. It is reported that other bulk cargoes, including coal, will be stored in the yard for loading ships. This yard is well served by railway tracks which connect with the lumber yard, previously mentioned. The depth at the head of the western pier is about 3.3m (11 ft.) and that at the eastern one is about 7.6m (25 ft.).

HARBOR—RIJEČKA LUKA

11D-38 Rijeka Luka, the principal harbor of the **Rijeka-Sušak-Branjdica-Brgud** group, is formed by a breakwater which extends 1,918 yards in a general west-north-westerly direction from the eastern end of the city near **Sušacka Luka**. The harbor is entered from westward through a passage about 260 yards wide between the head of the breakwater and the head of the westernmost mole. The breakwater is quayed on its inner side and has a high wall on its seaward side. The depths range from 35m (19 fm) at the entrance to about 6.4m (21 ft.) at its head with some patches of less depth at corners of some moles and quays. Vessels up to 680 feet in length can be accommodated and there are ample quayed berths and moles for ocean-going vessels. It was reported (1956) that depths of 9.1m (30 ft.), or more exists 6 to 9 feet off the piers. The largest merchant ships can be accommodated by breasting off. It was reported (1961) that a vessel drawing 31½ feet was moored on the east side of **Gat Lole Ribara**, breasted off about 15 to 20 feet.

About 300 yards westward of the root of the westernmost mole, there is a small boat basin with a narrow entrance facing westward. There are depths of 3.9m (13 ft.) to 5.5m (18 ft.) alongside the quays of this basin.

Between the boat basin and **Petrolejska Luka**, 370 yards westward, is **Splitska Obala** with depths of about 20.1m (11 fm) alongside its eastern half, thence, the depths gradually decrease to about 3.9m (13 ft.) near its western end. This quay is used as one of the berths for oil tankers and has an oil pipeline, and also an off-lying mooring buoy.

The head of the breakwater and that of the westernmost mole, **Gat Lole Ribara**, are each marked by a light.

HARBOR—PETROLEJSKA LUKA

11D-39 Petrolejska Luka consists of a basin formed by a right-angled breakwater, the southern part extending about 270 yards westward from **Splitska Obala**, providing an entrance about 50 yards wide, entered from

westward between the breakwater and a mole extending south-southwestward from the shore. The inner sides of the basin are quayed, including that of the breakwater. There are depths of 5.2m (17 ft.) to 8.5m (28 ft.) alongside the quays. The refinery and storage tanks lie northward of the basin. An oil pipeline services the quays.

HARBOR—LUKA BRGUD

11D-40 Luka Brgud lies about 1,600 yards westward of Petrolejska Luka and consists of shipbuilding and ship repair facilities. A breakwater, the extremity of which is marked by a light, extends about 360 yards west-southwestward from the shore enclosing a protected basin. The launching ways lie close northwestward of the head of the breakwater. Alongside a length of about 300 feet on the inner side of the breakwater, which is quayed, there is a depth of 7.9m (26 ft.).

Buoys.—A line of 7 buoys are reported (1968) extending in a 218° direction for about 5 miles with the inshore buoy about 1/4 mile southward of Luka Brgud. The outermost buoy is lighted.

LESSER HARBORS

11D-41 The torpedo works, known as A. Rankovic, situated midway between Petrolejska Luka and Luka Brgud, has a boat harbor formed by two moles with the entrance on its western side. A short T-headed pier with a depth of about 8.5m (28 ft.) at its head extends southward from the eastern side of the works. The buildings of the works are conspicuous.

Lučica Kantrida, located close westward of Luka Brgud, is a small cove protected south-

ward by a mole extending about 98 feet westward and is quayed for the most part. Small vessels not exceeding a draft of 11 feet can berth on the inner side of the mole.

Luka Martinšćica, located about 1¼ miles southeastward of the mouth of Rijeka Rečina, and which contains the quarantine hospitals for Rijeka-Sušaka Luka, is described in section 11C-37.

PILOTAGE

11D-41 Pilotage is compulsory for vessels over 500 gross tons. A harbor pilot boards ships about 1 mile off the harbor entrance.

FACILITIES

11D-42 The city of Rijeka and the town of Susak, combined population about 87,000 in 1961, stretch for about 3 miles from Kantrida to Brajdica with their seafaces bordered by quays. The city, backed by high land, contains several imposing buildings.

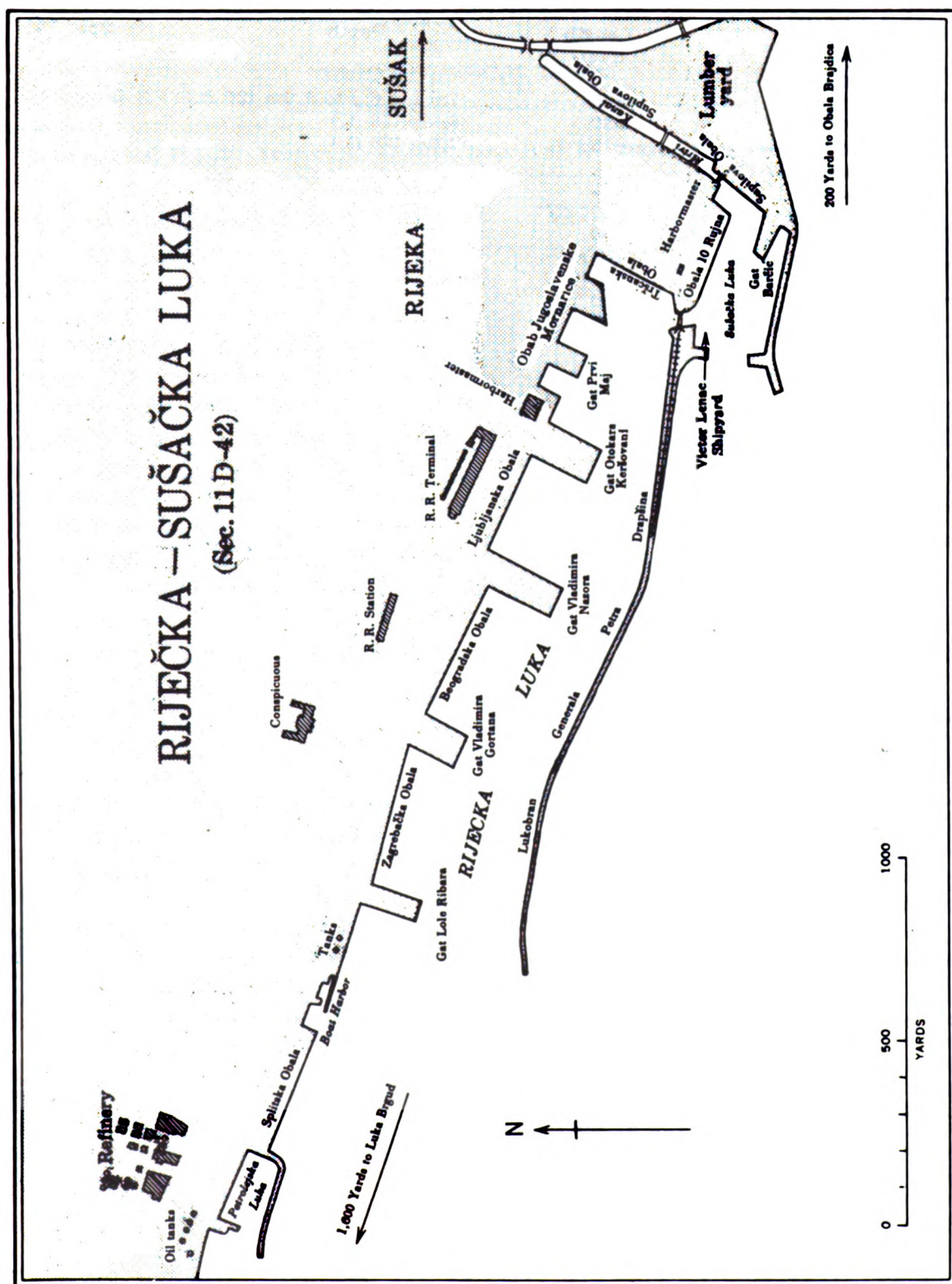
Among the industrial activities of the city are a medium-sized shipyard, oil refinery, chemical works, foundries, machine shops, grist mills, lumber mills, and a tobacco factory.

The port handles the largest commercial trade in Yugoslavia; among the exports are coal, minerals, grain, wine, and lumber; imports are chiefly machinery, cloth, phosphates, cotton, steel, cellulose, and paper.

Berths.—Rijeka Luka has about 11,000 feet of berthing space, exclusive of the breakwater, and Susacka Luka has about 4,500 feet.

Vessels can berth along the inner side of Lukobran Generala Petra Drapsina where there are alongside depths of about 4.5m (15 ft.) to 10.9m (36 ft.). The berths at the eastern part of this breakwater are reserved usually for vessels undergoing repairs.

Berth dimensions with alongside depths are approximately as follows:



Berth	Length (feet)	Depth	Use
Susacka Luka:			
Brajdia	680	7m (23 ft.) to 7.9m (26 ft.)	Lumber
Obala 10 Rujna	830	8.5m (28 ft.)	
Supilova Obala	475	7.6m (25 ft.)	
Gat Barcic:			
Head	100	7m (23 ft.)	
Northern side	350	7.9m (26 ft.)	
Southern side	330	7.9m (26 ft.) to 9.7m (32 ft.)	
Southern Breakwater	1,000	6.1m (20 ft.)	
Rijecka Luka:			
Trscanska Obala	650	7m (23 ft.) to 7.9m (26 ft.)	Local passenger vessels
Gat Prvi Maj:			
Head	165	7.6m (25 ft.)	
Western side	260	4.5m (15 ft.)	
Eastern side	260	6.7m (22 ft.)	General cargo and passenger vessels
Gat Otockara Kerso- vani:			
Head	260	7m (23 ft.)	
Western side	420	9.1m (30 ft.)	
Eastern side	490	9.1m (30 ft.)	
Ljubljanska Obala	820	9.1m (30 ft.)	
Gat Vladimira Nazora:			
Head	250	6.7m (22 ft.) to 9.1m (30 ft.)	
Western side	560	7.6m (25 ft.)	Grain
Eastern side	600	9.1m (30 ft.)	
Beogradska Obala	1,180	7m (23 ft.) to 7.6m (25 ft.)	
Gat Vladimira Gortana:			
Head	260	7m (23 ft.)	
Western side	395	9.1m (30 ft.)	
Eastern side	395	7.6m (25 ft.)	
Zagrebacka Obala	1,180	9.1m (30 ft.)	
Gat Lole Ribara:			Lumber and pe- troleum
Head	164	7.6m (25 ft.)	
Eastern side	520	7.3m (24 ft.)	
Splitska Obala	1,150	3.6m (12 ft.) to 20.1m (66 ft.)	

Tugs, lighters, and several cranes, the largest of which is a 100-ton floating type, are available in the harbor.

Supplies.—Provisions and fuel oil are available. Water is abundant and most quays and moles have hydrants.

Repairs can be carried out. The floating dry docks at Luka Brgud and Luka Rijeka have been removed. Luka Martinscica has been established as the new home of Viktor Lenac shipyard complex having facilities for handling up to 65,000 tons d.w. Facilities at Luka Martinscica include two floating docks, one 24,400 ton lift and the other with a 5500 ton lifting capacity.

Communication.—Rijeka is connected to the general railway system of the continent, the station being near the port.

There is frequent steamer service to other ports in Yugoslavia and less frequent service to other ports in the Adriatic and world ports.

There is a local air service.

A radio station is maintained.

Hospital.—There is a hospital with about 800 beds.

Deratting.—Deratting can be carried out and Deratting Certificates and Deratting Exemption Certificates issued.

BOKA KOTORSKA (ENTRANCE), YUGOSLAVIA.—Position: Lat. 42°27' N., Long. 18°34' E.; altitude 210 feet; years 1884–1909

Month	Pressure Mean, reduced to sea level (inches)	Air temperature (° F.)					Precipitation Amount (inches)		Mean number of days with—					Wind Directions (Percentage of Observations)										Speed (miles)
		Mean			Ex- tremes				Precipitation, 0.04 inches or more	Snow	Heavy fog	Thunderstorms	Poor visibility	Gales										
		Daily	Maximum	Minimum	Maximum	Minimum	Mean humidity (percent)	Mean cloud amount (percent)							Mean	Maximum in 24 hours	Snowfall							
January.....	30.04	48	52	44	63	29	74	57	4.09	13	—	—	—	—	25	29	9	14	5	4	8	4	2	—
February.....	29.96	48	53	44	65	29	73	57	4.13	12	—	—	—	—	25	26	8	14	7	4	9	5	2	—
March.....	29.92	52	58	48	77	33	74	57	4.57	12	—	—	—	—	20	30	6	18	8	6	11	6	3	—
April.....	29.92	57	64	52	79	39	77	55	3.74	12	—	—	—	—	20	14	8	18	10	5	12	7	—	—
May.....	29.92	65	72	60	90	46	77	51	2.36	9	—	—	—	—	19	11	5	17	9	5	12	10	—	—
June.....	29.95	72	80	67	95	53	73	40	1.65	7	—	—	—	—	21	11	5	15	8	3	19	12	—	—
July.....	29.92	77	86	71	100	60	70	24	0.83	4	—	—	—	—	22	10	4	10	6	3	17	7	—	—
August.....	29.92	76	85	71	102	59	70	25	1.30	4	—	—	—	—	24	13	4	9	6	5	18	15	—	—
September.....	30.01	71	78	66	96	57	74	34	2.56	6	—	—	—	—	27	17	4	11	7	4	17	9	—	—
October.....	30.01	64	70	60	83	40	77	53	4.02	12	—	—	—	—	25	19	6	17	10	5	11	4	—	—
November.....	30.01	56	62	53	74	32	74	57	4.21	12	—	—	—	—	24	25	8	14	11	4	9	3	—	—
December.....	30.01	51	55	47	67	30	76	61	4.88	13	—	—	—	—	23	29	10	14	9	3	7	3	—	—
Mean.....	—	61	68	57	—	—	74	48	38.34	—	—	—	—	—	23	19	6	14	8	4	14	3	4	—
Total.....	—	—	—	—	—	—	—	—	—	115	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Extremes.....	—	—	—	—	102	29	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. Yrs. Record.....	26	12	12	12	12	12	26	26	26	26	—	—	—	—	26								—	

BRINDISI, ITALY.—Position: Lat. 40°38' N., Long. 17°57' E.; altitude 10 feet; years 1880–1913 and 1936–1940

Month	Pressure Mean, reduced to sea level (inches)	Air temperature (° F.)					Precipitation Amount (inches)		Mean number of days with—						Wind Direction (Percentage of Observations)								Speed (miles)																					
		Mean			Ex- tremes				Mean humidity (percent)	Mean cloud amount (percent)	Mean	Maximum in 24 hours	Snowfall	Precipitation, 0.04 inches or more	Snow	Heavy fog	Thunderstorms	Poor visibility†	Gales	North	Northeast	East		Southeast	South	Southwest	West	Northwest	Calm															
		Daily	Maximum	Minimum	Maximum	Minimum	Mean cloud amount (percent)																																					
January.....	30.09	48	54	42	64	27	69	47	3.86	3.90	10	—	0.3	2	21	18	10	3	9	19	6	13	16	3	—																			
February.....	29.98	48	55	42	68	21	70	52	2.48	2.80	8	—	0.2	—	18	5	3	12	20	10	13	17	2	—																				
March.....	29.98	53	60	45	79	32	72	44	2.17	2.91	6	—	0.3	—	22	2	3	12	22	9	12	15	3	—																				
April.....	29.92	56	66	50	81	37	72	43	2.29	3.90	7	—	0.1	—	13	1	3	12	23	10	18	17	3	—																				
May.....	29.95	65	74	57	95	40	72	32	1.61	4.81	5	—	0.2	—	11	1	2	12	18	8	13	27	8	—																				
June.....	29.95	73	83	64	100	52	71	20	0.95	3.19	3	—	0.1	—	16	2	1	7	15	6	20	24	9	—																				
July.....	29.95	78	86	69	101	55	70	11	0.51	2.83	2	—	0.	—	18	3	1	3	9	4	21	31	10	—																				
August.....	29.98	77	86	68	102	50	71	13	1.06	5.24	2	—	0.	—	16	1	2	4	10	5	22	30	10	—																				
September.....	30.00	72	80	64	99	46	75	31	2.09	4.81	4	—	0.1	—	24	2	1	7	16	6	21	18	5	—																				
October.....	30.03	65	72	58	90	39	79	39	3.27	3.15	8	—	0.3	—	18	2	2	10	22	5	16	19	6	—																				
November.....	30.00	57	64	50	87	32	75	45	3.23	3.90	7	—	0.3	—	19	3	4	8	21	11	16	16	2	—																				
December.....	29.98	51	56	45	72	32	75	49	3.66	4.10	10	—	0.2	—	15	4	4	13	22	8	17	16	1	—																				
Mean.....	29.98	62	70	55	—	—	73	35	—	—	—	—	—	—	18	3	2	9	18	7	17	21	5	—																				
Total.....	—	—	—	—	—	—	—	—	27.16	—	72	—	2	5	—	—	—	—	—	—	—	—	—	—	—																			
Extremes.....	—	—	—	—	102	21	—	—	5.24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—																			
No. Yrs. Record.....	13	24	25	24	25	24	7-8	9-10	32	27	32	—	16	5	9-10								—																					

* 12½ miles.

• Less than 0.1.

DUBROVNIK, YUGOSLAVIA.—Position: Lat. 42°38' N., Long. 18°07' E.; altitude 49 feet; years 1870–1896 and 1910–1914

Month	Pressure Mean, reduced to sea level (inches)	Air temperature (° F.)					Precipitation Amount (inches)		Mean number of days with—						Wind Direction (Percentage of Observations)										Speed Mean (knots)					
		Mean			Ex- tremes				Mean humidity (percent)		Mean cloud amount (percent)		Amount (inches)		Precipitation, 0.04 inches or more	Snow	Heavy fog	Thunderstorms	Poor visibility	Gales¹	Direction									
		Daily	Maximum	Minimum	Maximum	Minimum															North	Northeast	East	Southeast		South	Southwest	West	Northwest	Calm
January	30.00	47	---	---	61	24	61	50	7.52	5.91	---	12	---	0.	---	---	---	3.	11	33	10	18	3	4	3	4	15	5.7		
February	30.00	48	---	---	66	24	61	43	4.06	2.56	---	9	---	0.	---	---	---	2.	13	24	13	18	3	4	4	6	17	4.9		
March	29.95	52	---	---	78	29	64	46	4.92	4.02	---	12	---	0.2	---	---	---	2.	11	17	8	26	3	6	6	19	4.9	4.9		
April	29.89	58	---	---	82	42	68	45	5.08	3.70	---	13	---	0.	---	---	---	1.	8	12	7	31	4	5	5	8	20	4.3		
May	29.92	65	---	---	88	47	68	39	5.11	2.52	---	9	---	0.3	---	---	---	0.7	7	7	6	26	3	5	5	10	20	2.7		
June	29.95	72	---	---	90	58	65	28	2.76	5.12	---	7	---	0.	---	---	---	0.6	6	6	3	24	3	5	5	13	31	2.4		
July	29.92	77	---	---	93	63	63	17	1.77	2.13	---	4	---	0.	---	---	---	0.3	7	7	12	19	3	5	5	16	33	2.1		
August	29.92	76	---	---	90	60	62	17	1.89	3.54	---	4	---	0.2	---	---	---	0.5	6	16	3	20	2	4	3	16	30	2.4		
September	29.98	72	---	---	87	54	66	30	4.61	4.02	---	4	---	0.	---	---	---	0.6	4	21	4	23	3	1	1	12	28	2.7		
October	30.00	64	---	---	84	38	68	46	7.60	5.63	---	12	---	0.	---	---	---	2.	8	16	3	31	4	6	4	5	22	5.3		
November	29.98	56	---	---	70	36	66	52	6.07	4.02	---	12	---	0.	---	---	---	2.	11	22	8	26	3	5	5	5	15	5.7		
December	30.00	50	---	---	65	27	65	53	7.13	5.55	---	13	---	0.	---	---	---	3.	11	28	10	22	3	4	3	4	15	5.7		
Mean	29.95	61	---	---	---	---	64	39	---	---	---	---	---	---	---	---	---	---	8	18	7	24	3	4	4	9	23	3.9		
Total	---	---	---	---	---	---	---	---	56.54	5.91	---	---	---	114	---	0.7	---	---	---	---	---	---	---	---	---	---	---	---		
Extreme	---	---	---	---	93	24	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
No. Yrs. Record	31	31	---	---	19	19	19	19	19	19	19	19	19	19	---	11- 12	---	---	---	---	---	---	---	---	---	---	---	10- 11		

¹ Force 6 or over on scale 0–10.

DURRES, ALBANIA.—Position: Lat. 41°19' N., Long. 19°28' E.; altitude 23 feet; years 1868–1884

Month	Pressure Mean, reduced to sea level (inches)	Air temperature (° F.)						Precipitation Amount (inches)	Mean number of days with—						Wind Direction (Percentage of Observations)										Speed Mean (knots)					
		Mean			Ex- tremes				Mean humidity (percent)		Mean cloud amount (percent)		Amount (inches)			Precipitation, 0.04 inches or more	Snow	Heavy fog	Thunderstorms	Poor visibility	Gales¹	Direction								
		Daily	Maximum	Minimum	Maximum	Minimum	Mean						Maximum in 24 hours	Snowfall	North							Northeast	East	Southeast		South	Southwest	West	Northwest	Calm
January	30.06	47	---	---	62	23	77	44	2.95	1.73	---	10	---	1.	1.8	---	2	38	16	12	18	4	3	2	2	5				
February	30.03	48	---	---	63	21	74	41	3.27	1.38	---	9	---	0.	1.4	---	4	33	13	8	19	8	6	4	5	4				
March	29.95	52	---	---	72	27	73	44	4.02	1.42	---	12	---	0.5	3.0	---	5	25	12	9	18	8	6	6	9	4				
April	29.89	58	---	---	79	40	72	39	2.20	1.54	---	8	---	1.5	1.2	---	2	23	10	10	13	11	8	3	16	6				
May	29.92	65	---	---	84	49	73	32	1.61	1.30	---	7	---	1.	1.8	---	2	19	6	14	12	9	8	5	20	7				
June	29.95	72	---	---	88	57	71	24	1.93	1.65	---	5	---	0.	2.3	---	1	24	8	12	11	7	5	4	19	10				
July	29.92	77	---	---	93	60	68	11	0.47	0.98	---	2	---	0.	1.8	---	4	41	4	8	8	2	1	2	24	10				
August	29.92	76	---	---	95	55	71	15	1.89	2.52	---	4	---	0.	2.9	---	2	30	7	9	10	3	3	4	27	7				
September	29.98	71	---	---	89	42	73	18	1.73	2.83	---	4	---	0.	1.6	---	2	38	7	7	10	6	5	4	17	6				
October	29.98	64	---	---	81	44	78	39	6.62	2.83	---	10	---	1.5	4.8	---	2	29	12	8	19	8	7	5	7	5				
November	29.98	55	---	---	70	34	79	50	8.43	4.33	---	14	---	0.	2.9	---	2	31	14	9	24	8	5	3	2	4				
December	29.98	49	---	---	68	28	79	51	7.36	3.78	---	12	---	0.5	3.3	---	2	27	13	10	24	10	7	3	2	4				
Mean	29.95	61	---	---	---	---	74	34	---	---	---	---	---	---	---	---	---	30	20	10	10	15	7	6	4	12	6			
Total	---	---	---	---	---	---	---	---	42.48	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
Extreme	---	---	---	---	95	21	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
No. Yrs. Record	15	50	---	---	9	9	9	9	9	9	9	9	9	9	---	2	---	---	---	---	---	---	---	---	---	---	---			

¹ Force 6 or over on scale 0–10.

KERKIRA, GREECE.—Position: Lat. 39°37' N., Long. 19°57' E.; altitude 89 feet; years 1852–1923

Month	Pressure Mean, reduced to sea level (inches)	Air temperature (° F.)						Precipitation Amount (inches)			Mean number of days with—						Wind Direction (Percentage of Observations)										Speed Mean (knots)	
		Mean			Ex- tremes						Mean number of days with—						Direction (Percentage of Observations)											
		Daily	Maximum	Minimum	Maximum	Minimum	Mean humidity (percent)				Mean cloud amount (percent)	Precipitation, trace or more	Snow	Heavy fog	Thunderstorms	Poor visibility	Gales¹	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm		
January.....	30.03	51	56	44	68	27	76	56	6.46	5.47	---	13	0.3	0.9	1.6	---	0.3	7	8	12	15	10	9	6	10	23	4.6	
February.....	29.98	52	57	45	73	23	76	54	5.47	8.08	---	12	0.3	0.8	1.0	---	0.1	9	6	10	19	11	8	6	9	22	4.9	
March.....	29.95	55	61	47	76	30	74	49	3.86	2.48	---	9	0	1	0.9	---	0.1	6	4	8	16	12	10	9	11	24	4.3	
April.....	29.92	60	67	52	83	37	74	47	3.03	3.86	---	9	0	0	1.5	0.9	---	0	5	4	5	15	14	12	10	11	24	4.3
May.....	29.92	68	75	58	94	45	73	38	1.89	3.27	---	6	0	0	0.9	0.8	---	0.1	7	7	6	13	12	10	9	10	26	3.3
June.....	29.92	74	82	64	95	53	71	25	0.98	2.60	---	5	0	0	0.1	1.0	---	0	10	8	5	11	9	7	9	14	27	3.3
July.....	29.89	79	87	69	101	57	67	11	0.24	1.18	---	2	0	3	1.1	---	0	11	7	7	6	7	6	5	10	18	30	3.3
August.....	29.92	79	87	69	102	59	67	13	0.87	3.35	---	5	0	1	1.9	---	0.1	10	8	5	7	6	5	5	10	14	35	2.7
September.....	29.98	75	82	65	96	50	70	27	3.07	6.10	---	5	0	1	1.9	---	0	8	4	5	10	10	9	10	12	32	3.0	
October.....	30.00	67	74	60	87	44	76	44	6.77	6.66	---	11	0	4	2.5	---	0.1	6	5	7	18	12	10	7	7	28	3.6	
November.....	30.00	60	65	53	79	30	76	57	7.52	5.08	---	11	0	3	2.0	---	0	6	6	10	17	12	10	8	8	23	4.6	
December.....	29.98	54	59	48	70	29	77	58	8.59	6.81	---	13	0.1	2	1.6	---	0.1	7	7	10	17	11	10	8	9	21	5.3	
Mean.....	29.95	65	71	56	---	---	73	40	---	---	---	---	---	---	---	---	---	8	6	7	14	10	9	9	11	26	3.9	
Total.....	---	---	---	---	---	---	---	---	48.78	---	---	---	98	0.7	19	16	---	0.9	---	---	---	---	---	---	---	---	---	
Extreme.....	---	---	---	---	102	23	---	---	---	8.08	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
No. Yrs. Record.....	29- 30	29- 30	34	37	35	38	49	49	49	37	---	19- 20	---	10	---	---	15	---	---	---	---	---	---	---	---	---	25	

¹ Force 9 or over on scale 0–10.

PATRAI, GREECE.—Position: Lat. 38°15' N., Long. 21°44' E.; altitude 103 feet; years 1870–1875 and 1894–1923

Month	Pressure Mean, reduced to sea level (inches)	Air temperature (° F.)					Mean humidity (percent)	Mean cloud amount (percent)	Precipitation			Mean number of days with—						Wind Direction (Percentage of Observations)										Speed Mean (knots)
		Mean			Ex- tremes				Amount (inches)			Precipitation, trace or more	Snow	Heavy fog	Thunderstorms	Poor visibility	Gales¹	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm		
		Daily	Maximum	Minimum	Maximum	Minimum			Mean	Maximum in 24 hours	Snowfall																	
January.....	30.03	51	56	44	71	27	76	57	3.98	1.97	0.2	14	-----	0.4	-----	0.5	21	19	11	11	15	8	4	3	7.3			
February.....	30.00	52	58	45	76	25	74	57	3.03	1.65	0.3	12	-----	0.5	-----	0.8	24	15	10	11	14	9	10	4	3	7.2		
March.....	29.98	56	62	48	82	28	72	53	2.48	2.60	0	10	-----	2	-----	0.1	21	16	10	8	14	11	13	4	3	7.6		
April.....	29.95	62	69	53	87	37	71	51	2.13	1.61	0	11	-----	1	-----	0.1	19	14	7	5	15	12	20	6	2	7.2		
May.....	29.95	69	76	59	98	44	69	43	1.42	1.35	0	8	-----	1	-----	0	20	8	6	5	13	13	24	7	4	6.5		
June.....	29.95	76	84	66	99	52	66	27	0.71	1.46	0	6	-----	0.3	-----	0	13	4	4	5	16	14	34	7	3	6.0		
July.....	29.92	81	90	70	103	56	61	09	0.16	0.98	0	1	-----	0.1	-----	0.1	16	8	4	4	13	13	30	8	4	6.5		
August.....	29.92	82	89	71	110	59	60	10	0.24	1.10	0	2	-----	0.9	-----	0.1	19	8	6	5	14	14	23	6	5	6.5		
September.....	30.00	76	84	67	101	52	64	20	1.18	2.64	0	5	-----	0.2	-----	0	21	14	10	8	11	11	17	4	4	6.5		
October.....	30.03	68	75	60	91	41	72	42	3.66	2.32	0	11	-----	0.6	-----	0.4	24	14	12	11	11	7	14	3	4	6.0		
November.....	30.03	59	65	52	83	28	75	56	4.53	3.27	0	13	-----	0.7	-----	0.1	26	18	12	12	9	8	9	3	3	6.8		
December.....	30.03	53	59	47	74	30	77	58	4.84	2.24	0.1	13	-----	1	-----	0.3	22	19	12	11	13	8	8	3	4	6.5		
Mean.....	29.98	65	72	57	-----	-----	70	40	-----	-----	-----	-----	-----	-----	-----	-----	21	13	9	8	13	11	17	5	3	6.8		
Total.....	-----	-----	-----	-----	-----	-----	-----	-----	23.35	-----	-----	106	-----	9	-----	3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----		
Extreme.....	-----	-----	-----	-----	110	25	-----	-----	-----	3.27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----		
No. Yrs. Record.....	29	30	32	32	33	33	30	32	34	34	26	20	-----	11	-----	15	35										29	

¹ Force 9 or over on scale 0–10.

RIJEKA, YUGOSLAVIA.—Position: Lat. 45°19' N., Long. 14°27' E.; altitude 16 feet; years 1861–1906

Month	Pressure Mean, reduced to sea level (inches)	Air temperature (° F.)					Mean humidity (percent)	Precipitation			Mean number of days with—						Wind										Speed Mean (knots)
		Mean			Ex- tremes			Amount (inches)			Precipitation, 0.04 inches or more	Snow	Heavy fog	Thunderstorms	Poor visibility	Gales¹	Direction (Percentage of Observations)										
		Daily	Maximum	Minimum	Maximum	Minimum		Mean	Maximum in 24 hours	Snowfall							North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm		
January.....	30.06	42	48	35	68	15	68	58	3.74	3.15	11	11	2	0.3	0.4	16	28	9	6	6	5	3	7	20	3.9		
February.....	30.03	43	50	36	66	17	67	58	3.82	4.06	10	10	2	0.5	0.2	15	24	11	8	6	7	3	5	21	3.3		
March.....	29.92	48	55	40	77	20	67	58	4.96	2.99	12	12	2	1.0	0.3	10	21	9	8	7	10	6	6	23	3.0		
April.....	29.92	55	63	47	80	33	68	61	4.92	2.68	13	13	2	1.1	0.1	8	15	9	8	8	11	9	6	26	2.7		
May.....	29.95	62	71	54	91	39	71	57	4.89	2.87	15	15	1	4.0	0.4	8	13	10	9	7	12	9	7	25	2.7		
June.....	29.95	68	77	60	92	46	71	53	5.32	6.38	14	14	0.8	5.3	0.4	8	12	7	8	6	14	10	8	27	2.1		
July.....	29.95	74	83	64	99	50	65	38	2.83	2.80	9	9	0.9	6.2	0.5	10	12	7	6	4	14	9	8	30	2.4		
August.....	29.95	73	82	63	99	47	66	36	4.18	5.08	9	9	1	4.3	0.6	9	14	8	6	4	12	9	9	29	2.7		
September.....	30.00	66	75	58	96	41	71	46	7.13	9.26	11	11	1	4.0	0.5	11	18	9	6	7	8	7	6	28	2.7		
October.....	30.00	58	65	51	80	31	75	61	9.26	10.56	15	15	2	2.3	0.6	11	21	10	8	9	9	4	6	22	3.6		
November.....	30.00	49	56	43	75	23	72	60	6.97	6.85	13	13	2	1.7	0.6	15	24	11	7	8	7	3	5	20	3.6		
December.....	30.03	44	50	37	70	13	69	60	5.47	3.86	11	11	1	0.9	0.4	16	26	9	7	6	6	3	7	20	3.3		
Mean.....	29.98	57	65	49	-----	-----	69	54	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----		
Total.....	-----	-----	-----	-----	99	13	-----	-----	63.51	-----	-----	-----	143	-----	18	31.6	-----	5	-----	-----	-----	-----	-----	-----	-----		
Extreme.....	-----	-----	-----	-----	99	13	-----	-----	-----	10.56	-----	-----	35	-----	35	-----	-----	35	-----	-----	-----	-----	-----	-----	-----		
No. Yrs. Record.....	46	36	26-27					36	36	36	38	36	36	36	23	36	35								36		

¹ Force 6 or over on Scale 0-10.

ŠIBENIK, YUGOSLAVIA.—Position: Lat. 43°43' N., Long. 15°54' E.; altitude 16 feet; years 1885–1912

Month	Pressure Mean, reduced to sea level (inches)	Air temperature (° F.)						Precipitation Amount (inches)		Mean number of days with—					Wind Direction (Percentage of Observations)										Speed Mean (knots)	
		Mean			Ex- tremes					Mean humidity (percent)	Mean cloud amount (percent)	Precipitation, 0.04 inches or more	Snow	Heavy fog	Thunderstorms	Poor visibility	Gales¹	Direction								
		Daily	Maximum	Minimum	Maximum	Minimum	North	Northeast	East									Southeast	South	Southwest	West	Northwest	Calm			
January.....	30.06	42	50	36	62	17	80	42	2.44	1.77	9	9	1	0.2	0.3	13	36	3	16	3	0	1	2	26	4.6	
February.....	30.00	45	52	38	68	23	79	45	2.64	2.17	8	8	0.2	0.2	0.3	11	30	2	18	5	2	2	4	26	4.6	
March.....	29.95	50	58	42	71	23	78	43	2.24	1.54	9	9	0.2	0.2	0.3	9	20	2	19	8	6	5	5	28	3.9	
April.....	29.92	56	64	47	83	33	76	40	2.20	2.13	8	8	0.6	0.6	0.3	8	20	1	18	8	6	6	4	29	4.3	
May.....	29.95	64	73	55	87	43	77	37	2.76	3.70	9	9	0	0	0.1	7	14	2	14	8	7	8	6	34	3.6	
June.....	29.95	72	81	62	99	50	72	29	2.40	1.73	7	7	0	0	0.7	9	14	1	9	9	8	11	5	34	3.0	
July.....	29.95	76	85	66	101	54	68	20	1.42	2.44	4	4	0	0	0.9	11	16	1	4	5	7	11	8	37	2.7	
August.....	29.98	75	84	66	103	54	71	18	1.34	1.81	4	4	0	0	0.9	11	14	2	5	5	6	11	6	40	3.0	
September.....	30.03	68	77	60	95	43	77	27	2.64	4.61	6	6	0	0	0	11	16	2	8	6	5	10	5	37	2.7	
October.....	30.00	61	68	54	86	36	82	39	4.33	2.87	8	8	0.1	0.1	0.2	11	19	3	18	8	4	5	5	27	3.6	
November.....	30.03	52	59	45	82	29	80	44	4.73	3.23	10	10	0.4	0.4	0.3	11	29	2	20	5	2	1	3	27	4.3	
December.....	30.00	46	53	40	68	21	80	46	3.43	2.40	11	11	2	2	0.4	10	32	4	18	5	1	1	2	27	4.6	
Mean.....	29.98	59	67	51	-----	-----	77	36	-----	-----	-----	-----	-----	-----	-----	10	22	2	14	6	4	6	5	31	3.6	
Total.....	-----	-----	-----	-----	103	17	-----	-----	32.58	-----	-----	-----	93	-----	4	-----	25	-----	-----	-----	-----	-----	-----	-----	-----	-----
Extreme.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.61	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
No. Yrs. Record.....	22	24	17	17	24	24	24	24	27	24	-----	24	24	10	-----	23	24								-----	

¹ Force 6 or over on scale 0-10.

SPLIT, YUGOSLAVIA.—Position: Lat. 43°31' N., Long. 16°26' E.; altitude 420 feet; years 1851–1913 and 1926–1928

Month	Pre- sure	Air temperature (° F.)						Mean humidity (percent)	Mean don't amount (percent)	Precipitation			Mean number of days with—						Wind										Speed (miles)
		Mean				Ex- tremes				Amount (inches)			Precipitation, 0.04 inches or more	Snow	Heavy fog	Thunderstorms	Poor visibility	Gales¹	Direction (Percentage of Observations)										
		Daily	Maximum	Minimum	Maximum	Minimum	Mean			Maximum in 24 hours	Snowfall	North							Northeast	East	Southeast	South	Southwest	West	Northwest	Calm			
January	45	52	42	58	22	63	47	2.95	0.75	—	8	0.3	0	1	0.3	0.3	6	40	11	15	9	3	3	3	12	—			
February	46	54	42	64	24	66	57	2.44	0.67	—	11	0.3	0	0.3	0.3	0.3	7	41	8	11	7	6	1	3	14	—			
March	51	58	46	69	34	65	49	2.99	2.09	—	10	0	0	2	0	0	4	27	11	29	7	10	3	3	14	—			
April	58	65	54	78	41	65	50	3.35	1.14	—	10	0	0.3	1	0.03	0.03	3	19	14	23	10	13	2	2	14	—			
May	65	70	56	83	45	61	41	2.68	1.85	—	6	0	0.3	0	0	0	5	19	10	21	11	16	4	3	14	—			
June	73	80	65	92	51	61	39	2.17	3.50	—	7	0	0	4	0.03	0.03	6	17	10	16	11	16	3	4	18	—			
July	78	88	71	99	50	54	24	1.18	1.34	—	5	0	0	5	0.03	0.03	6	18	7	7	10	20	8	4	20	—			
August	77	88	71	98	57	54	20	1.65	1.03	—	4	0	0	4	0	0	8	23	6	5	10	20	5	5	18	—			
September	70	81	66	94	52	61	32	2.91	4.06	—	7	0	0	5	0	0	8	23	9	16	13	14	3	2	13	—			
October	62	69	58	78	42	68	43	4.41	1.38	—	10	0	0	3	0	0	6	30	10	19	10	10	3	3	9	—			
November	53	63	54	73	37	66	49	4.17	1.18	—	11	0	0	0	0	0	6	25	7	31	14	3	3	2	8	—			
December	47	51	42	61	22	69	55	3.62	1.54	—	14	0	0	5	0.03	0.03	12	44	16	14	5	3	1	2	4	—			
Mean	60	68	56	—	—	63	43	—	—	—	—	—	—	—	—	—	6	27	10	17	10	11	3	3	13	—			
Total	—	—	—	—	—	—	—	34.52	—	—	102	0.6	0.6	42	0.8	—	—	—	—	—	—	—	—	—	—	—	—		
Extreme	—	—	—	99	22	—	—	—	4.06	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
No. Yrs. Record	50	3	3	3	3	3	10	24	3	—	—	3	3	3	—	—	3										—		

¹ Over 20 knots.

TRIESTE, FREE TERRITORY OF TRIESTE.—Position: Lat. 45°39' N., Long. 13°45' E.; altitude 85 feet; years 1841–1910 and 1936–1940

Month	Pressure Mean, reduced to sea level (inches)	Air temperature (° F.)					Mean humidity (percent)	Mean cloud amount (percent)	Precipitation			Mean number of days with—						Wind										Speed Mean (knots)
		° F.							Amount (inches)			Precipitation, 0.04 inches or more	Snow	Heavy fog	Thunderstorms	Poor visibility ¹	Gales ²	Direction (Percentage of Observations)								Calm		
		Daily	Maximum	Minimum	Maximum	Minimum			M'an	Maximum in 24 hours	Snowfall							North	Northeast	East	Southeast	South	Southwest	West	Northwest			
January.....	30.09	40	44	36	60	15	71	56	2.40	2.91	1.7	8	2	9.0	0.2	7	4	1	33	22	11	2	3	5	3	20	11	
February.....	30.04	42	47	37	60	14	69	55	2.32	2.80	1.2	7	1	6.7	0.2	7	2	1	31	21	12	1	4	5	5	20	9	
March.....	29.95	47	53	42	73	24	67	55	2.43	3.46	1.2	9	1	5.7	0.4	4	1	1	27	18	14	3	5	8	6	18	8	
April.....	29.89	55	62	49	85	35	65	58	2.99	2.76	0.2	10	0.2	1.8	0.9	0.8	2	21	19	13	2	6	10	10	17	8		
May.....	29.85	63	70	56	90	40	65	55	3.70	3.70	0	11	0	0.6	2	0.9	2	19	16	14	2	10	10	10	17	6		
June.....	29.95	71	78	63	95	45	65	52	4.02	3.35	0	11	0	0.9	4	0.3	2	16	18	13	3	9	11	10	18	6		
July.....	29.95	75	84	68	99	52	61	39	3.19	2.56	0	8	0	0.9	5	0	2	18	18	11	2	8	13	9	19	6		
August.....	29.98	74	82	67	96	49	62	36	3.66	4.92	0	8	0	1.0	4	0.1	2	21	11	1	1	5	13	9	17	6		
September.....	30.00	67	75	62	92	48	66	42	4.72	3.62	0	11	0	1.2	3	0.3	1	23	24	15	2	6	9	7	14	7		
October.....	30.00	59	64	54	80	31	72	56	5.98	5.39	0.1	11	0.1	2.2	2	2	1	26	23	18	2	5	6	5	13	8		
November.....	30.04	49	53	45	67	22	71	59	4.09	3.62	0.6	10	0.7	4.6	0.7	6	3	1	32	23	15	2	4	4	3	16	9	
December.....	30.04	42	46	38	67	16	71	60	3.07	2.24	1.4	9	1	8.3	0.3	6	3	1	31	24	16	2	4	3	3	16	10	
Mean.....	29.99	57	63	51	.....	.....	67	52	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	25	21	14	2	6	8	6	17	7
Total.....	.....	.....	.....	.....	.....	.....	.....	.....	42.97	.....	6.4	111	6	42.9	23	38	19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Extreme.....	.....	.....	.....	99	14	.....	.....	.....	5.39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
No. Yrs. Record.....	40	62	34	34	34	34	70	60	60	70	60	10	60	5	18	28										18

¹ 2½ miles.

² Velocity greater than 39 knots (force 9).

³ Less than 0.4.

VENEZIA, ITALY.—Position: Lat. 45°26' E., Long. 12°20' E.; altitude 82 feet; years 1836–1926

Month	Pressure Mean, reduced to sea level (inches)	Air temperature (° F.)						Mean humidity (percent)	Mean cloud amount (percent)	Precipitation			Mean number of days with—						Wind Direction (Percentage of Observations)										Speed Mean (miles)
		Mean			Ex- tremes					Amount (inches)			Precipitation, 0.04 inches or more	Snow	Heavy fog	Thunderstorms	Poor visibility ¹	Gales ²											
		Daily	Maximum	Minimum	Maximum	Minimum	Mean			Maximum in 24 hours	Snowfall	North							Northeast	East	Southeast	South	Southwest	West	Northwest	Calm			
January.....	30.09	37	41	32	56	14	80	59	1.61	2.60	6	0.6	9	0	8.5	1	26	25	5	2	4	8	8	15	7	5			
February.....	30.04	41	46	36	62	20	78	56	1.57	1.85	7	0.4	9	0	9.9	0.7	21	24	9	9	9	8	5	9	6	6			
March.....	29.94	47	52	42	73	24	75	59	2.00	1.65	9	0.4	5	0	4.1	0.7	14	23	13	19	12	7	2	5	5	6			
April.....	29.92	55	60	49	77	36	73	59	2.36	2.76	11	0.1	0.7	2	2.0	0.8	10	19	16	26	14	6	2	5	2	7			
May.....	29.94	63	70	58	86	42	70	55	2.91	3.27	9	0	0.5	2	1.8	0.7	9	16	14	27	18	8	1	4	3	8			
June.....	29.94	71	77	64	91	50	68	52	2.95	1.97	10	0	0	2	0.6	0.7	8	12	12	31	19	8	3	5	2	6			
July.....	29.94	76	82	68	97	54	65	39	2.28	2.00	6	0	0.1	3	0.2	0.3	10	14	13	32	16	6	3	4	2	6			
August.....	29.97	74	81	67	95	50	67	37	2.48	2.48	7	0	0.1	3	0.7	0.7	13	19	12	26	16	4	2	5	3	6			
September.....	30.04	67	73	60	89	38	72	47	2.80	5.04	8	0	0.7	1	2.9	0.7	19	21	12	19	13	5	2	5	4	6			
October.....	30.00	58	63	52	77	28	77	60	3.59	3.23	9	0	0	1	3.4	0.9	24	23	9	11	12	8	2	6	5	6			
November.....	30.04	47	51	42	69	23	79	63	2.68	2.87	8	0.3	4	0	5.1	0.7	28	25	4	4	6	9	7	12	5	6			
December.....	30.04	40	44	36	61	18	79	64	1.89	3.11	7	0.2	8	0	11.0	0.7	32	20	4	2	3	10	7	17	5	5			
Mean.....	30.00	56	62	51	---	---	74	54	---	---	97	2.0	39	14	50.2	9	18	20	10	17	12	7	4	8	4	6			
Total.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
Extreme.....	---	---	---	---	97	14	---	---	---	5.04	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
No. Yrs. Record.....	70	51	34	34	40	40	50	42	85	40	25	---	8	---	5½	22- 23	40-41								7- 8	8			

¹ 2½ miles.² Force 6 or over on scale 0-10.

VIS, YUGOSLAVIA.—Position: Lat. 43°05' N., Long. 16°15' E.; altitude 79 feet; years 1870-1909

Month	Pressure Mean, reduced to sea level (inches)	Air temperature (° F.)					Precipitation Amount (inches)		Mean number of days with—						Wind Direction (Percentage of Observations)										Speed Mean (miles)		
		Mean			Ex- tremes				Mean humidity (percent)		Mean cloud amount (percent)		Snowfall		Precipitation, 0.04 inches or more	Snow	Heavy fog	Thunderstorms	Poor visibility	Gales ¹	Direction (Percentage of Observations)						
		Daily	Maximum	Minimum	Maximum	Minimum	Mean	Maximum in 24 hours													North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm
January.....	30.00	49	-----	-----	62	21	74	44	2.28	2.24	9	-----	0.2	-----	-----	1.5	15	10	17	19	7	3	5	23	1	11.1	
February.....	29.98	50	-----	-----	63	28	74	41	1.69	1.42	8	-----	0.1	-----	-----	1	13	10	16	20	8	2	7	23	1	11.1	
March.....	29.89	52	-----	-----	68	30	76	42	1.65	2.44	8	-----	0.4	-----	-----	2	11	6	12	28	9	3	7	22	2	10.6	
April.....	29.86	58	-----	-----	72	40	78	42	1.65	2.83	8	-----	0.5	-----	-----	0.8	7	5	10	30	10	2	9	24	3	9.7	
May.....	29.92	64	-----	-----	82	48	77	36	1.18	3.46	6	-----	0.7	-----	-----	0.4	6	2	6	28	10	2	12	30	4	8.9	
June.....	29.92	71	-----	-----	88	54	74	30	1.02	1.77	5	-----	0.5	-----	-----	0.2	6	3	4	20	9	2	13	38	5	7.6	
July.....	29.92	77	-----	-----	93	61	71	17	0.51	2.24	3	-----	0.2	-----	-----	0.1	8	3	3	13	8	1	14	45	5	7.6	
August.....	29.95	76	-----	-----	91	62	72	18	0.87	3.11	3	-----	0.5	-----	-----	0.2	7	2	4	16	8	1	11	44	6	7.3	
September.....	29.98	71	-----	-----	87	51	76	27	1.73	3.11	5	-----	0.3	-----	-----	0.2	8	4	8	21	8	2	9	35	5	7.6	
October.....	29.95	65	-----	-----	80	42	78	41	2.76	7.01	8	-----	0.7	-----	-----	1	8	5	9	29	12	4	7	24	2	10.2	
November.....	29.98	57	-----	-----	71	34	75	43	2.76	2.91	9	-----	0.2	-----	-----	1	12	8	12	23	12	4	6	22	1	10.3	
December.....	29.95	55	-----	-----	67	30	75	48	2.95	2.68	10	-----	0	-----	-----	2	14	9	15	20	11	4	6	20	1	10.6	
Mean.....	29.95	62	-----	-----	-----	75	36	-----	-----	-----	82	-----	4	-----	-----	10	10	6	10	22	9	2	9	29	3	9.3	
Total.....	-----	-----	-----	-----	-----	-----	-----	-----	21.08	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Extreme.....	-----	-----	-----	-----	93	21	-----	-----	7.01	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
No. Yrs. Record.....	40	40	-----	-----	38	38	38	38	37- 38	37- 38	37- 38	-----	25- 26	-----	-----	25- 26	38								26	26	

¹ Force 7 or over on scale 0-10.

VLONE, ALBANIA.—Position: Lat. 40°27' N., Long. 19°30' E.; altitude 20 feet; years 1851–1900

Month	Pre- sure	Air temperature (° F.)						Mean humidity (percent)	Mean cloud amount (percent)	Precipitation	Mean number of days with—						Wind										Speed
		Mean								Amount (inches)	Precipitation, 0.01 inches or more	Snow	Heavy fog	Thunderstorms	Poor visibility	Gales¹	Direction (Percentage of Observations)									Mean (knots)	
Mean	Daily	Maximum	Minimum	Maximum	Minimum	Mean	Mean	Maximum in 24 hours	Snowfall	Mean	Maximum in 24 hours	Snow	Heavy fog	Thunderstorms	Poor visibility	Gales¹	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Mean (knots)	
January		43	63	32			55	3.86			8																
February		50	63	36			46	3.74			7																
March		53	70	41			48	4.09			9																
April		59	76	46			36	2.32			5																
May		66	86	54			38	1.38			4																
June		73	90	60			28	1.89			4																
July		77	94	64			14	0.51			1																
August		76	94	62			19	1.81			3																
September		71	88	58			31	3.98			6																
October		65	81	50			46	5.24			6																
November		57	73	41			62	7.68			11																
December		50	65	34			57	5.55			10																
Mean		62	79	48			40																				
Total								42.05			74																
Extreme																											
No. Yrs. Record		50						50																			

OCEAN AREA.—Position: Lat. 40°45' N., Long. 15°20' E.; years 1882–1933
(Greenwich noon observations)

Month	Number of observations surveyed	Wind										Weather													Mean cloud amount (0 10)	Average air temperature	Average sea surface temperature
		Mean velocity (knots)	Percentages of observations from—									Percentages of observations recording															
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility				
January	37	3.7	3	6	5	26	8	19	8	25	0	0.11	0.05	0.03				0.03				0.03	0.11	5.4			
February	23	4.1	22	4	5	13		13	8	35	0	0.04		0		0.12	0.04	.04		0.08		.13		5.2			
March	37	3.6	8	16	8	21	14	6	6	21	0	0.05		0		.05	.03	.04		.03		0	.05	4.8			
April	35	3.5	32	14	3	11	8	3	3	20	6	.08		0	0.05		.03	.03		.03		.03	.05	3.8			
May	35	2.9	9	8	14	14	3	3	15	34	0	.19	.03	.03		.03						0	.05	4.7			
June	37	3.4	21	11	3	16	6	0	3	35	5	.08	.03	.03		.08		0.03	.08			.08	.03	3.9			
July	46	2.5	15	7	0	19	4	2	11	33	9		0	0		.02		.02				0	.08	2.2			
August	22	2.3	5	0	9	5	9	8	14	27	23	.09		0								0	.22	2.6			
September	16	2.4	12	6	26	25	19	0	6	6	0	.29		0								0	.11	1.9			
October	39	3.0	8	10	13	18	18	8	3	17	5	.14	.07	.02		.07		.02				0	.10	5.4			
November	33	4.0	15	6	12	28	12	15	6	6	0	.03	.03	0		.03		.03		.06		.06	.06	5.5			
December	28	3.4	14	10	0	22	15	11	21	7	0	.04		.04	.04					.11		0	.04	5.6			
Means		3.2	13.7	8.2	8.2	18.2	9.6	7.3	8.7	22.1	4.0			1.25								2.91		4.2			
Totals	388													①													

GLOSSARIES

Words found occasionally on charts and Sailing Directions

ALBANIAN

Albanian	English
Fan	Stream
Gji	Bay
Gjol	Lake, lagoon
Gryk'	Ravine
Gur	Mountain
Kënet'	Lagoon, lake
Kep, kep'	Cape, point
Kodër	Mountain
Liqen	Lake
Lum	River
Maj', maja	Mountain, ridge, slope
Monastir	Monastery
Pellg	Bight, gulf
Përroj	Stream
Rëre	Cove
Rrug-ë, -a	Road, way, street
Shën, -e	Saint
Shkamb	Rock, cliff, crag
Skele, skelja	Mole, pier, small port
Skjep	Cape
Suk	Mountain
Uj të	Water

GREEK

Greek	English
Ákra	Cape
Áyios, áyía, áyion	Saint
Dhiórix	Canal
Kástron	Castle, fort
Kefála	Head
Kólpos	Gulf
Limín	Harbor
Nisi; nisiá	Island; islands
Nísos; nísoi	Island; islands
Nísis; nísídhēs	Islet; islets
Órmos	Bay
Óros; óri	Mountain; mountains
Pétra	Rock, stone
Pírgos	Tower
Porthmós	Narrows
Potámi, potamós	River
Poúnda	Cape, point
Sténon; sténa	Strait; straits
Yéfira	Bridge
Xéra	Reef

ITALIAN

Italian	English
Albero	Mast, tree
Allineamento	Range, bearing
Alta marea	High water
Ampiezza della marea	Tidal range
Ancoraggio	Anchorage
Approdo	Landing place
Arena	Sand, gravel
Argilla	Clay
Avamporto	Outer harbor
Bacino	Basin, dock
Bacino di marea	Wet dock
Bacino galleggiante	Floating dock
Baia	Bay
Banchina	Quay, wharf, embankment
Banco	Bank
Bandiera	Flag
Bassa marea	Low water
Basso fondo	Shoal
Bianco	White
Boa da ormeggio	Mooring buoy
Bocca	Mouth or entrance of a channel or passage
Bosco, boschi, boscaglia	Forest
Braccio	Fathom, arm
Busa	Inlet
Cala	Cove
Calata	Quay
Campanile	Steeple, belfry
Canale; canali	Channel; channels
Cantiere	Shipyards
Capitaneria di porto	Harbor office
Capo	Cape
Casa; case	House; houses
Casa Finanza	Customhouse
Castel or Castello	Castle, keep
Chiaro	Light in color
Chiesa	Church
Cimitero	Cemetery
Città	City
Colle; colli	Hill; hills
Collina	Small hill
Costa	Coast
Croce	Cross
Cupo	Dark in color
Darsena	Wet dock
Diga	Breakwater
Dogana	Customhouse
Fango, fangosa	Mud
Faro	Light, lighthouse
Ferrovia	Railroad
Fiume; fiumi	River; rivers
Fonda	Depth
Fumaiolo	Chimney
Giallo	Yellow
Golfo	Gulf
Grande	Large, big
Grigio	Gray

ITALIAN—Continued

Italian	English
Grosso	Large, coarse
Guglia	Spire
Isola; isole	Island; islands
Isolotto; isolotti	Islet; islets
Istmo	Isthmus
Lago; laghi	Lake; lakes
Laguna	Lagoon
Lido	Beach
Mare	Sea
Marea alle Sizigie	Spring tide
Marina	Beach, port of an inland town
Molo	Mole, pier
Montagna	Mountain
Monte; monti	Mountain; mountains
Naviglio	Navigable channel
Nuovo, nuova	New
Ormeggio	Mooring
Ospedale	Hospital
Pali	Piles
Passagio	Passage
Penisola	Peninsula
Picco	Peak
Piccolo, piccola	Small
Pilota	Pilot
Pineta	Pine grove
Ponte	Bridge
Pontile	Pier, wharf
Porto	Harbor, port
Portocciolo	Small harbor
Promontorio	Promontory
Punta	Point
Rada	Roadstead
Rio	Stream
Riva	Shore, bank, quay
Rocca	Rock, crag
Rosso	Red
Rovina	Ruin, ruins
Sabbia	Sand
Sacca	Enclosed bay
Sanita	Health office
San, Santo, Santa	Saint
Scogliera	Reef of rocks awash, breakwater
Scoglio; scogli	Reef, rock; reefs, rocks
Secca; secche	Shoal; shoals
Seno	Small bay, cove
Sporgente	Mole, jetty, pier
Stretto	Strait
Testa	Head, bluff
Torre; torri	Tower; towers
Torrent	Torrent
Valle	Valley, inlet of
Vecchio, vecchia	Old
Verde	Green
Vetta	Summit
Via	Road, street

YUGOSLAVIAN

Yugoslavian	English
Beli, bela, belo	White
Bijeli, bijela, bijelo	White
Brdo	Mountain
Crni, crna, crno	Black
Crveni, crvena, crveno	Red
Desno	Right
Donji, donja, donjo	Lower
Draga	Cove
Gat, gata	Mole, pier
Gospa	Our Lady
Greben; grebeni	Rock, reef; rocks, reefs
Hrid; hridi, hridine	Above-water rock; above-water rocks
Jezero	Lake
Jug	South
Kamen	Stone, rock
Kanal	Channel
Križ; križa	Cross; of the cross
Kula	Tower
Lijevo	Left
Luka	Port, harbor, bay
Mali, mala, malo	Small
Mlin	Mill
More	Sea
Motka	Beacon
Mulj	Mud
Novi, nova, novo	New
Obala	Quay, shore
Ostrvo; ostrvi	Island; islands
Otočić; otočići	Islet; islets
Otok; otoci	Island; islands
Pesak	Sand
Plićak	Shoal
Plićina	Shoal
Plutača	Buoy
Poluotok	Peninsula
Polutočić	Small peninsula
Pristanište	Landing place, berth
Prolaz	Passage
Rat	Point, cape
Reka	River
Rijeka	River
Rt	Point, cape
Sidrište	Anchorage, roadstead
Stari, stara, staro	Old
Sv.	Saint
Sveti, sveta, sveto	Saint
Svetionik	Lighthouse
Svjetlo	Light
Tanki, tanka, tanko	Slender
Tesnac	Strait, narrows
Uvala	Bay
Veli, vela, velo	Large
Veliki, velika, veliko	Large
Vrata	Passage
Vrh	Summit
Yugo	Scirocco
Zaliv	Bay, gulf
Zaton	Bay, gulf
Zeleni, zelena, zeleno	Green

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CONVERSION TABLES

FEET TO METERS

Feet	0	1	2	3	4	5	6	7	8	9
0	0.00	0.30	0.61	0.91	1.22	1.52	1.83	2.13	2.44	2.74
10	3.05	3.35	3.66	3.96	4.27	4.57	4.88	5.18	5.49	5.79
20	6.10	6.40	6.71	7.01	7.32	7.62	7.92	8.23	8.53	8.84
30	9.14	9.45	9.75	10.06	10.36	10.67	10.97	11.28	11.58	11.89
40	12.19	12.50	12.80	13.11	13.41	13.72	14.02	14.33	14.63	14.93
50	15.24	15.54	15.85	16.15	16.46	16.76	17.07	17.37	17.68	17.98
60	18.29	18.59	18.90	19.20	19.51	19.81	20.12	20.42	20.73	21.03
70	21.34	21.64	21.95	22.25	22.55	22.86	23.16	23.47	23.77	24.08
80	24.38	24.69	24.99	25.30	25.60	25.91	26.21	26.52	26.82	27.13
90	27.43	27.74	28.04	28.35	28.65	28.96	29.26	29.57	29.87	30.17

FATHOMS TO METERS

Fathoms	0	1	2	3	4	5	6	7	8	9
0	0.00	1.83	3.66	5.49	7.32	9.14	10.97	12.80	14.63	16.46
10	18.29	20.12	21.95	23.77	25.60	27.43	29.26	31.09	32.92	34.75
20	36.58	38.40	40.23	42.06	43.89	45.72	47.55	49.38	51.21	53.03
30	54.86	56.69	58.52	60.35	62.18	64.01	65.84	67.67	69.49	71.32
40	73.15	74.98	76.81	78.64	80.47	82.30	84.12	85.95	87.78	89.61
50	91.44	93.27	95.10	96.93	98.75	100.58	102.41	104.24	106.07	107.90
60	109.73	111.56	113.39	115.21	117.04	118.87	120.70	122.53	124.36	126.19
70	128.02	129.85	131.67	133.50	135.33	137.16	138.99	140.82	142.65	144.47
80	146.30	148.13	149.96	151.79	153.62	155.45	157.28	159.11	160.93	162.76
90	164.59	166.42	168.25	170.08	171.91	173.74	175.56	177.39	179.22	181.05

METERS TO FEET

Meters	0	1	2	3	4	5	6	7	8	9
0	0.00	3.28	6.56	9.84	13.12	16.40	19.68	22.97	26.25	29.53
10	32.81	36.09	39.37	42.65	45.93	49.21	52.49	55.77	59.06	62.34
20	65.62	68.90	72.18	75.46	78.74	82.02	85.30	88.58	91.86	95.14
30	98.42	101.71	104.99	108.27	111.55	114.83	118.11	121.39	124.67	127.95
40	131.23	134.51	137.80	141.08	144.36	147.64	150.92	154.20	157.48	160.76
50	164.04	167.32	170.60	173.88	177.16	180.45	183.73	187.01	190.29	193.57
60	196.85	200.13	203.41	206.69	209.97	213.25	216.54	219.82	223.10	226.38
70	229.66	232.94	236.22	239.50	242.78	246.06	249.34	252.62	255.90	259.19
80	262.47	265.75	269.03	272.31	275.59	278.87	282.15	285.43	288.71	291.99
90	295.28	298.56	301.84	305.12	308.40	311.68	314.96	318.24	321.52	324.80

METERS TO FATHOMS

Meters	0	1	2	3	4	5	6	7	8	9
0	0.00	0.55	1.09	1.64	2.19	2.73	3.28	3.83	4.37	4.92
10	5.47	6.01	6.56	7.11	7.66	8.20	8.75	9.30	9.84	10.39
20	10.94	11.48	12.03	12.58	13.12	13.67	14.22	14.76	15.31	15.86
30	16.40	16.95	17.50	18.04	18.59	19.14	19.68	20.23	20.78	21.33
40	21.87	22.42	22.97	23.51	24.06	24.61	25.15	25.70	26.25	26.79
50	27.34	27.89	28.43	28.98	29.53	30.07	30.62	31.17	31.71	32.26
60	32.81	33.36	33.90	34.45	35.00	35.54	36.09	36.64	37.18	37.73
70	38.28	38.82	39.37	39.92	40.46	41.01	41.56	42.10	42.65	43.20
80	43.74	44.29	44.84	45.38	45.93	46.48	47.03	47.57	48.12	48.67
90	49.21	49.76	50.31	50.85	51.40	51.95	52.49	53.04	53.59	54.13

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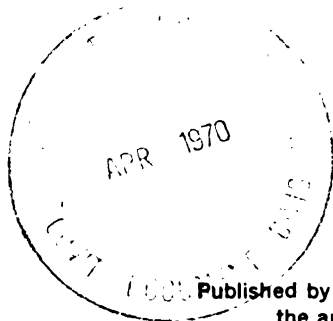
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